— SUGGESTED/REQUIRED UPDATES-

NAME BP44 BEARPAW DHF
NOM

PENDING

HELI TOW CART BY VANAIR

314-0013-00-D
BearPaw Preparation & Packaging

1- Inspecter composantes fabriquées: *(Par Quality System Manager)*

- Utiliser formulaire *F30-01 Receiving Inspection General*
- Prendre connaissance des données d'inspection des frabricants
- Utiliser plan d'inspection prescrit (modifier le plan d'inspection au besoin)
- Assigner no de lot "LN-yymmdd-xx". (xx étant le séquentiel).
- Identifier le contenant avec le no de lot assigné, le P/N de la pièce et la quantité reçue
- Ranger en zone de storage des pièces de BearPaws

2- Effectuer emballage des kits: *(Par Quality System Manager)*

- Insérer toutes les petites composantes dans des sacs
- Insérer les deux Pads de bearpaws ainsi que les sacs de composantes dans la boite appropriée
- Bourrer contenu de la boite de papier protecteur (si applicable)
- Apposer étiquette d'identification du type de produit sur la boîte. Cocher le produit applicable.

3- Effectuer assemblage documentaire: *(Par Quality System Manager)*

- Assembler dans sacs :
  (1) Master Document List (MDL)
  (2) Instruction d'installation du produit
  (3) Certificat de manufacturier SH06-24
  (4) STC Transport Canada
  (5) STC FAA USA

4- Inspecter produit fini: *(Par Quality System Manager)*

- Utiliser formulaire *F40-02 Release Inspection General*
- Utiliser plan d'inspection prescrit et modifier le plan d'inspection au besoin
- Effectuer les contrôles prescrits et Enregistrer résultats.
- Enregistrer données de traçabilité des composantes utilisées (utiliser tableau en annexe si trop de données de sous lots pour le tableau situé sur le formulaire F40-02)
- Assigner no de lot "LNF-yymmdd-xx". (xx étant le séquentiel).
- Émettre certificat de relâche temporaire pour chaque kit (F40-01 Authorized Release Certificate)
- Identifier au marqueur chaque boite avec le no LNF et son no de kit (séquentiel), (no doit être bien en vue lorsque les boites sont mises prêtes à expédier)
- Apposer le formulaire F40-01 Release Certificate temporaire avec le bon séquentiel sur le rebord de chaque boite (facilement détachable pour émettre le certificat en version finale au moment venu)
- Ranger les kits assemblés dans la zone de storage des bearpaws prêts à vendre

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5- Au moment de la vente: *(Par Quality System Manager)*

- Émettre certificat de relâche officiel (F40-01 Authorized Release Certificate).

Réaliser le certificat sur format électronique (Données électroniques localisées à : Quality System/ Official Records/ Release Certificates), le nommer avec le no de facture et nom de l'acheteur. Mettre en pied de page le nom du fichier créé. Imprimer. Signer ce certificat original.

- Conserver une copie du certificat signé au DHR avec la copie temporaire, classer par ordre de no de lot.
- Insérer l'originale signée dans le sac de documents dans la boite à expédier.

Nature de la modification de l'instruction : Revue en profondeur de la méthode de travail.

D. Boulanger

2011 12 10

T: 1-418-561-4512, f: 1-418-836-4575, 877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada G7A 5K6
www.helitowcart.com info@helitowcart.com

HELI TOW CART BY VANAIR

314-0016-05-C
BearPaw
Heat Shrink Installation

1- Install Shrink:

- Prepare Heat Shrink:

  BP44 & BP66:
  Use 1.5" wide shrink. Cut to 5.5" length.

  BP350 & BP130:
  Use 1.5" wide shrink. Cut to 6.75" length.

- Insert U clips into shrink.
- Set U clips standing or on their side on aluminum sheet on cookie pan.
- Heat in oven at 350F for approx. 5 minutes or until shrink is tightly resting against stainless steel on its whole surface.

Nature modifications: Complete update of instruction

D. Bailey 2017 06 01

t: 1-418-561-4512, 877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada G7A 5K6
www.helitowcart.com info@helitowcart.com

NAME Poor TC
NOM

No.

CAN: STC

Aviatech
SERVICES TECHNIQUES inc.

Trois-Rivières, 27 novembre, 2013

Projet: A2007-09

Nathalie Barbeau
VP Commercial Affairs
Helitowcart (Vanair inc.)
877a Alphonse-Desrochers
St-Nicolas, Levis
Québec, Canada
G7A 5K6

Objet: STC SH06-24 Issue #4 - Documentation complémentaire

Madame,

Pour des raisons de propriété intellectuelle, certains des documents de la Master Document List HTC-MDL-BP-R44-1000 révision D ne font pas partie du DVD client. Si vous avez besoin de ces documents, vous pouvez vous les procurer en contactant Aviatech Services Techniques ou Transport Canada aux coordonnées suivantes :

Aviatech Services Techniques	**Transport Canada**
2595 St-Olivier	Services de l'aviation civile
Trois-Rivières (Québec)	700, Place Leigh-Capreol
G9A 4G1	Dorval (Québec)
819-601-8049	H4Y 1G7
Contact : Mirko Zgela (Président)	1-800-305-2059

Dans l'éventualité ou Aviatech Services Techniques cesserait ses activités, toute la documentation serait encore disponible à Transport Canada.

Sincèrement,

Mirko Zgela
Design Approval Representative DAR #310

Aviatech Services Techniques Inc.
2595, rue St-Olivier
Trois-Rivières, Québec, G9A 4G1
Tel: (819) 601-8049 Fax: (819) 377-7928
Courriel: info@ats-ast.com
Site internet: www.ats-ast.com

2013 11 29

Lettre obtenue de Mirko pour expliquer que les doc. suivants ne nous seront jamais fournis:

Projet BP4466

- AAC-CPL-BP-R44-1000 rev A
- ATS-0709-FTP-1000, rev NC
- ATS-0709-TM-1000, rev NC

Aviatech
SERVICES TECHNIQUES inc.

Trois-Rivières, 27 novembre, 2013

Projet: A2007-09

Nathalie Barbeau
VP Commercial Affairs
Helitowcart (Vanair inc.)
877a Alphonse-Desrochers
St-Nicolas, Levis
Québec, Canada
G7A 5K6

Objet: STC SH06-24 Issue #4 - Installation of Helitowcart BearPaw

Madame,

Vous trouverez ci-joint la documentation pour la version 4 du certificat SH06-24 selon votre PO # nb-130702-01. Veuillez détruire le DVD que vous reçu avec la lettre datée du 8 novembre 2013.

En espérant le tout à votre entière satisfaction,

Sincèrement,

Jean-François Lemire, ing.
Directeur d'ingénierie

Aviatech Services Techniques Inc.
2595, rue St-Olivier
Trois-Rivières, Québec, G9A 4G1
Tel: (819) 601-8049 Fax: (819) 377-7928
Courriel: info@ats-ast.com
Site internet: www.ats-ast.com

Transport Canada		**Date:** August 28, 2013
Statement of Conformity With Certification Basis		**Approval #** Q-SH06-24 Issue #4
Model No	**Type of equipment**	
R44, R44 II, R66, AS 350 D, AS 350 B, AS 350 B1, AS 350 B2, AS 350 B3, AS 350 BA, EC 130 B4, AS 355 E, AS 355 F, AS 355 F1, AS 355 F2, AS 355 N	BearPaw	

Statement of Conformity

As the applicant to the modification approved under the STC Q-SH06-24 Issue #4, I hereby declare that the modifications listed above and defined in the following Master Document Lists:

For the R44 Series and R66:
HTC-MDL-BP-R44-1000, Revision D dated August 28, 2013

For the AS350 and AS355 Series:
HTC-MDL-BP-AS350/355-1000, Revision G dated December 21, 2012

For the EC130 - B4:
HTC-MDL-BP-EC130-1000, Revision A dated May 13, 2011

are conform to the best of my knowledge with its certification basis established by the Minister.

Signature: _____
Mirko Zgela (DAR#310)

On behalf of: Helitowcart

Position title: President

Company/Organization: Aviatech Technical Services Inc

Installation/Operating Data,
Required Equipment and Limitations (Cont'd):

For the Eurocopter (formerly Aerospatiale) AS350 and AS355 Series Helicopters:

Installation of Helitowcart Bear Paw BP350 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-AS350/355-1000, Revision F dated April 8, 2010, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0020-00-E, BearPaw Model BP350, Installation Instructions – AS350/355, Revision F dated December 21, 2012 or later Transport Canada approved revision.

For the Eurocopter EC 130 Helicopters:

Installation of Helitowcart Bear Paw BP130 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-EC130-1000, Revision A dated May 13, 2011, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0031-00-A, BearPaw Model BP130, Installation Instructions – EC130, Revision A dated May 04, 2011 or later Transport Canada approved revision.

Fleet Eligibility List		
Make	**Model**	**Type Certificate Data Sheet**
Robinson	R44	H-97
Robinson	R44 II	H-97
Robinson	R66	H-111
Eurocopter	AS 350 B	H-83
Eurocopter	AS 350 B1	H-83
Eurocopter	AS 350 B2	H-83
Eurocopter	AS 350 B3	H-83
Eurocopter	AS 350 BA	H-83
Eurocopter	AS 350 D	H-83
Eurocopter	EC 130 B4	H-83
Eurocopter	AS 355 E	H-87
Eurocopter	AS 355 F	H-87
Eurocopter	AS 355 F1	H-87
Eurocopter	AS 355 F2	H-87
Eurocopter	AS 355 N	H-87

– End –

DESIGN APPROVAL DOCUMENT TRANSFER

Transfer of this design approval document requires the prior approval of the Minister and the reissue of this document in the name of the transferee.

The reissue of this design approval document in the name of the transferee will be contingent on the holder and the transferee fulfilling their responsibilities as described in section 521.357 of the *Canadian Aviation Regulations*.

TRANSFERT DU DOCUMENT D'APPROBATION DE LA CONCEPTION

L'approbation préalable du ministre est exigée en vue d'un transfert de ce document d'approbation de la conception et la réédition de ce document au nom du cessionnaire.

La réédition de ce document d'approbation de la conception au nom du cessionnaire est conditionnelle à la satisfaction des exigences et des responsabilités, du titulaire et du cessionnaire, décrites dans l'article 521.357 du *Règlement de l'aviation canadien*.

Transfer to:

Aero Design Ltd.

9888A Malaspina Rd.

Powell River, BC, Canada

V8A 0G3

I have reviewed the above requirements and recognize that until the above requirements are met the certificate and all its privileges and obligations will not be transferred.

J'ai examiné les conditions susmentionnées et je comprends que le transfert du certificat et des privilèges et des obligations s'y rattachant ne sera pas effectué tant que ces conditions n'auront pas été respectées.

Signature of holder/signature du titulaire

Jacob Cheinard
CEO. Accountable executive

date/date

2018-04-11
(y - m - d)

Signed copy for transfer

Transport Canada Transports Canada

Department of Transport

Supplemental Type Certificate

This approval is issued to:

Helitowcart (Vanair Inc.)
877A, Alphonse-Desrochers
St-Nicholas, Lévis, Québec
Canada G7A 5K6

Number: SH06-24
Issue No.: 4
Approval Date: August 17, 2006
Issue Date: October 10, 2013

Responsible Office: Québec

Aircraft/Engine Type or Model: See Continuation Sheet on Page 2 of 2

Canadian Type Certificate or Equivalent: See Continuation Sheet on Page 2 of 2

Description of Type Design Change: Installation of Helitowcart BearPaw

Installation/Operating Data, Required Equipment and Limitations:

For the Robinson Models R44, R44 II and R66 Helicopters:

Installation of Helitowcart Bear Paw BP44 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-R44-1000, Revision D dated August 28, 2013, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0011-00, BearPaw Model BP44, Installation Instructions – R44/R66, Revision E dated August 09, 2013 or later Transport Canada approved revision.

See Continuation Sheet Page 2 of 2

Conditions: This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated **will not** adversely affect the airworthiness of the modified product.

Jean-Pierre Francoeur
For Minister of Transport

Canada

Transport Canada Transports Canada

Department of Transport

Supplemental Type Certificate

This approval is issued to:

Helitowcart (Vanair Inc.)
877A, Alphonse-Desrochers
St-Nicholas, Lévis, Québec
Canada G7A 5K6

Number: SH06-24
Issue No.: 4
Approval Date: August 17, 2006
Issue Date: October 10, 2013

Responsible Office: Québec

Aircraft/Engine Type or Model: See Continuation Sheet on Page 2 of 2

Canadian Type Certificate or Equivalent: See Continuation Sheet on Page 2 of 2

Description of Type Design Change: Installation of Helitowcart BearPaw

Installation/Operating Data, Required Equipment and Limitations:

For the Robinson Models R44, R44 II and R66 Helicopters:

Installation of Helitowcart Bear Paw BP44 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-R44-1000, Revision D dated August 28, 2013, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0011-00, BearPaw Model BP44, Installation Instructions – R44/R66, Revision E dated August 09, 2013 or later Transport Canada approved revision.

See Continuation Sheet Page 2 of 2

Conditions: This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated **will not** adversely affect the airworthiness of the modified product.

Jean-Pierre Francoeur
For Minister of Transport

Canada

Installation/Operating Data,
Required Equipment and Limitations (Cont'd):

For the Eurocopter (formerly Aerospatiale) AS350 and AS355 Series Helicopters:

Installation of Helitowcart Bear Paw BP350 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-AS350/355-1000, Revision F dated April 8, 2010, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0020-00-E, BearPaw Model BP350, Installation Instructions – AS350/355, Revision F dated December 21, 2012 or later Transport Canada approved revision.

For the Eurocopter EC 130 Helicopters:

Installation of Helitowcart Bear Paw BP130 is to be performed in accordance with TC approved Helitowcart Master Document List Report: HTC-MDL-BP-EC130-1000, Revision A dated May 13, 2011, or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Document: 314-0031-00-A, BearPaw Model BP130, Installation Instructions – EC130, Revision A dated May 04, 2011 or later Transport Canada approved revision.

Fleet Eligibility List		
Make	**Model**	**Type Certificate Data Sheet**
Robinson	R44	H-97
Robinson	R44 II	H-97
Robinson	R66	H-111
Eurocopter	AS 350 B	H-83
Eurocopter	AS 350 B1	H-83
Eurocopter	AS 350 B2	H-83
Eurocopter	AS 350 B3	H-83
Eurocopter	AS 350 BA	H-83
Eurocopter	AS 350 D	H-83
Eurocopter	EC 130 B4	H-83
Eurocopter	AS 355 E	H-87
Eurocopter	AS 355 F	H-87
Eurocopter	AS 355 F1	H-87
Eurocopter	AS 355 F2	H-87
Eurocopter	AS 355 N	H-87

– End –

DRAFT

AWAITING APP'D VERSION

Department of Transport

Supplemental Type Certificate

2011 0629

This approval is issued to:

Number: Q-SH06-24

Helitowcart
877A Alphonse-Desrochers
St-Nicolas, Levis, (Québec)
Canada G7A 5K6

Issue No. : 3
Approval Date: May 04, 2011
Issue Date: May 25, 2011

Sorry Drafts: Adresse a été changée mais qu'on l'a remise comme avant sur le certificat final!

Responsible Office:

Aircraft/Engine Type or Model:

Canadian Type Certificate or Equivalent:

Description of Type Design Change:

Installation/Operating Data, Required Equipment and Limitations:

Installation Data:

For the R44 Series:

Installation of is to be performed in accordance with TC approved Helitowcart Master Document List HTC-MDL-BP-R44-1000, Revision C dated April 15, 2010 or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Installation Instructions document "314-0011-00-D, BearPaw Model BP44, Installation Instructions – R44" as specified by Helitowcart Inc. Master Document List HTC-MDL-BP-R44-1000.

For the AS350 and AS355 Series:

Installation of is to be performed in accordance with TC approved Helitowcart Master Document List HTC-MDL-BP-AS350/355-1000, Revision F dated April 8, 2010 or later Transport Canada approved revision.

The BearPaw must be installed in accordance with Helitowcart Inc. Installation Instructions document "314-0020-00-E, BearPaw Model BP350, Installation Instructions – AS350/355" as specified by Helitowcart Master Document List HTC-MDL-BP-AS350/355-1000.

Conditions: This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the modified product.

Jean Pierre Francoeur
Aircraft Certification Engineer
For Minister of Transport

5 dec 2008

De: Pierre Richard de TC
À: NB
objet update STC vs Nouvelle adresse

2008 Pour faire faire maj de STC.
pour chang. d'adresse!
Je décide donc de ne pas le changer!

On gardera donc le 860 Marie-Victorin
comme adresse de STC.

NB

Transport Canada / Transports Canada

DESIGN CHANGE APPROVAL APPLICATION

See Instructions on reverse side

DEMANDE D'APPROBATION MODIFICATION DE LA CONCEPTION

Voir les instructions au verso

1. Name and address of applicant - Nom et adresse du demandeur	2. Name and address of prospective holder - Nom et adresse du titulaire éventuel
	877A ALPHONSE-DESROCHERS S

3. Identification of aeronautical product - Identification du produit aéronautique

Make - Marque	Model - Modèle	Registration - Immatriculation	Serial No. - N° de série	Part No. - N° de la pièce

4. Request for (check appropriate box) - Objet de la demande (Cocher la case appropriée)

A. ☐ Supplemental Type Certificate (STC) / Certificat de type supplémentaire (CTS)

B. ☐ Repair Design Certificate (RDC) / Certificat de conception de réparation (CCR)

C. ☐ Parts Design Approval (PDA) / Approbation de conception de pièces (ACP)

D. ☐ Limited STC (LSTC) / CTS restreint (CTSR)

E. ☐ FAA STC / CTS de la FAA

F. ☐ Revision / Révision — No. / N° _____ Issue / Édition _____

G. ☐ Type design examination of a foreign change / Examen de définition de type modification étrangère

Has the PDA holder applied for a Manufacturer Approval? / Le détenteur PDA a-t-il demandé un certificat de constructeur conformément? ☐ Yes / Oui ☐ No / Non

FAA STC / Other: / CTS de la FAA / Autre: _____

5. Title and brief description of modification, repair or replacement part including effects of changes (use additional pages if necessary)
Titre et brève description de la modification, de la réparation ou de la pièce de rechange, y compris les effets des changements (utilisez des feuilles supplémentaires si nécessaire)

6. Applicable Canadian or FAA Type Certificate (TC) - Certificat de type (CT) canadien ou de la FAA pertinent

A. Canadian TC No. - N° de CT canadien	B. FAA TC No. - N° de CT FAA	C. Others (specify) - Autres (préciser)

7. Proposed basis of certification - Base de certification proposée

A. ☐ Same as Canadian TC / Identique à celle du CT canadien

B. ☐ Same as FAA TC / Identique à celle du CT FAA

C. ☐ Others (specify) / Autres (préciser) _____

8. Documentation to be submitted (use additional pages if necessary) / Documentation à soumettre (utilisez des feuilles supplémentaires si nécessaire)	Applicant - Demandeur		For TCCA use - Réservé à l'usage de TCAC				
	To be submitted / À soumettre		Required / Requise		Received / Reçue		
	Yes - Oui	No - Non	Yes - Oui	No - Non	Yes - Oui	No - Non	Date (Y-A/M/D-J)
Compliance program / Programme de respect des normes							
Certification plan / Plan de certification							
Master drawing or top drawing list / Plan ou liste de plans techniques							
Flight manual supplement / Supplément au manuel de vol							
Master minimum equipment list / Liste principale d'équipement minimal							
Maintenance/repair manual supplement / Supplément au manuel d'entretien et de réparation							
Instructions for continuing airworthiness / Instructions relatives au maintien de la navigabilité							
Airworthiness limitations / Limites de navigabilité							
Engineering reports / Rapports techniques							
Design drawings / Devis de conception							
Manufacture drawings & installations instructions / Plans de construction et instructions de montage							
Electrical load analysis / Bilan électrique							
Draft STC, LSTC, RDC or PDA / Ébauche de CTS, CTSR, CCR ou ACP							
Weight and moment change data / Changement de masse et de moment							
Flight test data / Données d'essai en vol							
Others (specify) / Autres documents (préciser)							

9. Applicant's remarks - Remarques du demandeur

REVISION DE STC DEMANDÉE POUR TENIR

10. I agree to pay charges as prescribed in CAR, Part 1, Subpart 4 (CAR 104-Charges) and/or to reimburse Transport Canada incremental expenses as prescribed in Civil Aviation Directive No. 3, as applicable.

Je m'engage à payer les redevances prescrites à la sous-partie 4 de la partie I du RAC (sous-partie 104 du RAC – Redevances) et/ou à rembourser à Transports Canada les dépenses supplémentaires telles qu'exigées dans la Directive de l'Aviation civile n° 3, selon le cas.

Name and Signature of Applicant - Nom et signature du demandeur | Title - Poste | Date (Y-A/M/D-J)

11. Transport Canada signature acknowledges receipt of the application - La signature d'un représentant de Transports Canada accuse réception de la requête

Name and Signature - Nom et signature | Title - Poste | Date (Y-A/M/D-J)

26-0469 (0207-04)

Canada

200$ c !

Je decide de pas changer

GENERAL INFORMATION/REMARKS

(1) Please type or print in block letters.
(2) The returned copy may be accompanied with any additional information or instructions considered necessary. Use additional pages if necessary.
(3) Before proceeding with the submission of an application for a modification, or a repair design certificate or a part design approval, it is suggested that applicants obtain and familiarize themselves with Chapter 513 of the CARs and the AWM.

GÉNÉRALITÉS/REMARQUES

(1) Veuillez dactylographier ou écrire en lettres moulées.
(2) La copie retournée peut être accompagnée de toute information additionnelle ou ligne directrice jugée utile. Utilisez des feuilles supplémentaires si nécessaire.
(3) Avant de soumettre une demande visant l'approbation d'une modification, d'une réparation ou d'une approbation de conception de pièces, il est suggéré que les demandeurs se procurent et prennent connaissance du chapitre 513 du RAC/MN.

BLOCK 1

Enter the name and address of the applicant where a person other than the holder submits the application, e.g., delegate, consultant firm, modification center, etc.

BLOCK 2

Enter the name and address of the prospective holder. The approval document will be issued in the name of the person or organization designated as the holder.

BLOCK 3

When applying for an STC under Block 4A, enter the make, e.g., Cessna; model, e.g., 172C. In this case, serial numbers and registration marks need not be provided.

When applying for an STC covering multiple aeronautical products having separate type certificates (TC), prepare a product eligibility list identifying the corresponding TC document for each product for which an approval is sought.

When applying for a PDA enter the Type Certificate holder's part number in the Part No. box.

BLOCK 4

Based on the definitions outlined in section 513.02 of the AWM, determine what type of approval will be required and enter an "X" in the appropriate box. Blocks 4A to 4E.

When requesting a revision to an existing approval under Blocks 4A to 4E, enter an "X" in the appropriate type of approval box and in Block 4F for revision; enter the existing approval number, its current issue No. or revision status.

For PDA in Block 4C, indicate if a 561 Manufacturer Approval has been applied for. The PDA holder must also be the 561 Manufacturer Approval Holder.

BLOCK 5

Enter the title of the proposed modification, e.g., Manufacture and installation of nose gear fairing and provide a brief description of the modification or repair, e.g. This modification consists of "...".

BLOCK 6

Determine whether the model for which a modification approval is sought is operated in Canada under a TC. Enter the number of the applicable TC in Block 6A or 6B as appropriate.

For PDA parts to be accepted by the FAA, both the Canadian and the FAA TC numbers must be provided in Block 6A and 6B as appropriate.

Some aircraft may be operated under an authoritative document other than a TC. In such case specify document in Block 6C.

BLOCK 7

A modification or a repair design certificate will normally be approved under the same basis as applied to the basic product itself. Where a TC exists for that product, enter an "X" in Block 7A or 7B as applicable. Where a TC does not exist, enter an "X" in Block 7C.

The applicant has the option to choose and comply with later airworthiness standards, e.g., Chapter 523 of the AWM instead of CAR 3 upon which the basic product was originally type certificated. In such a case, specify in Block 7C the proposed airworthiness standards.

BLOCK 8

Based on the nature of the modification, determine which type of documentation is required for submission and indicate as appropriate in "Submitted" column. Regional guidance may be sought in establishing documentation requirements.

BLOCK 9

Specify any additional information considered appropriate. Attachments may be used where necessary.

BLOCK 10

Applicant name and signature, including title and date is required.

BLOCK 11

Transport Canada name and signature, including title and date, on a returned copy acknowledges receipt of the application.

CASE 1

Inscrire le nom et l'adresse du demandeur lorsque la demande est soumise par une personne autre que le titulaire, p. ex. un délégué, une entreprise d'experts-conseils, un centre de modifications, etc.

CASE 2

Inscrire le nom et l'adresse du titulaire éventuel. Le document d'approbation sera délivré au nom de la personne ou organisme désigné comme titulaire.

CASE 3

Lors d'une demande soumise pour la délivrance d'un CTS, case 4A, inscrire la marque, p. ex. Cessna; le modèle, p. ex. 172C. Dans ce cas, il n'est pas nécessaire d'inscrire les n^{os} de série et d'immatriculation.

Lors d'une demande soumise pour la délivrance d'un CTS visant plusieurs produits aéronautiques ayant été certifiés en vertu de documents distincts, il est nécessaire de produire une liste d'admissibilité et de préciser les documents CT visant chaque produit pour lequel une approbation est demandée.

Lors d'une demande soumise pour la délivrance d'une ACP, inscrire le numéro de la pièce du titulaire du certificat de type à la case identifiée N° de la pièce.

CASE 4

En vertu des critères précisés à l'article 513.02 du MN, établir le genre d'approbation requis et préciser par un « X » dans la case appropriée. Cases 4A à 4E.

Lors d'une demande soumise visant une révision à être apportée à une approbation existante sous l'une des conditions énumérées à la case 4A, 4B, 4C ou 4D, inscrire un « X » dans la case appropriée pour le type et dans la case 4F pour la révision; inscrire le numéro de l'approbation existante, son édition courante ou son état de révision.

Pour une ACP à la case 4C, indiquer si un certificat d'agrément du constructeur du 561 a été appliqué. Le titulaire d'une ACP doit également être le titulaire d'un certificat d'agrément du constructeur du 561.

CASE 5

Inscrire le titre de la modification proposée, p. ex. : Fabrication et montage de carénage sur le train avant d'atterrissage et fournir une description succincte de la modification ou de la réparation, p. ex. : Cette modification consiste à "...".

CASE 6

Établir si le modèle, pour lequel une approbation de modification est demandée, est exploité au Canada en vertu d'un CT. Inscrire le numéro de CT pertinent à la case 6A ou 6B, selon le cas.

Afin que l'approbation de conception des pièces soit acceptée par la FAA, chacun des numéros de CT canadien et de la FAA doivent être indiqué à la case 6A et 6B tel qu'approprié.

Advenant que l'aéronef en question soit exploité sous la tutelle d'un document législatif autre qu'un CT préciser le document à la case 6C.

CASE 7

Une approbation de modification ou de réparation sera normalement délivrée conformément aux critères en vertu desquels le produit fut certifié. Lorsqu'un CT existe pour le produit visé, inscrire un « X » à la case 7A ou 7B, selon le cas. Advenant l'absence d'un document CT pour le produit visé, inscrire un « X » à la case 7C.

Le demandeur a le choix d'opter pour des normes de navigabilité plus récentes et d'y satisfaire, p. ex. celles prescrites au chapitre 523 du MN, au lieu de celles précisées au RAC 3 sur la base desquelles le produit en question fut originalement à la sous-partie certifié. Le cas échéant inscrire à la case 7C les normes de navigabilité proposées.

CASE 8

Selon la nature de la modification, établir les exigences de documentation d'appui requise, et indiquer par un « X » à la colonne « Soumise ». Le personnel régional peut vous fournir l'aide nécessaire pour établir les documents requis.

CASE 9

Fournir toute information additionnelle jugée utile. Des pièces additionnelles peuvent être utilisées si nécessaire.

CASE 10

La nom et signature du demandeur, y compris la mention de son poste et la date de soumission, est requise.

CASE 11

La nom et signature d'un représentant de Transports Canada, y compris la mention de son poste et la date de soumission, sur une copie retournée a pour but d'accuser réception de la demande.

Nathalie Barbeau

From: Nathalie Barbeau [nbarbeauhelitowcart@gmail.com]
Sent: November 25, 2008 8:28 PM
To: nbarbeau@helitowcart.com
Subject: Fwd: Changement d'adresse pour votre STC

---------- Forwarded message ----------
From: **Lachapelle, Sébastien** <sebastien.lachapelle@tc.gc.ca>
Date: 2008/11/25
Subject: Changement d'adresse pour votre STC
To: "'Nathalie Barbeau' (E-mail)" <nbarbeauhelitowcart@gmail.com>

Bonjour Nathalie,
Voici le formulaire pour faire votre changement d'adresse avec le groupe certification des aéronefs afin de modifier le STC en conséquence.
Vous n'aurez qu'à faire parvenir le formulaire au bureau régional.
Dans votre cas, c'est M. Pierre Richard (Certification des aéronefs) (514) 633-3602 qui fut l'ingénieur approbateur de la dernière version du STC.
Vous pourrez profiter de l'occasion pour vous renseigner sur la procédure à suivre pour la familiarisation de votre produit avec l' EASA et la FAA.

<<Design Change Approval Application Form #26-0469 version 0207-04 (current on Jan 2007).pdf>>

P.S.L'adresse de M. Richard est la même que la mienne.

Salutation

Sébastien Lachapelle
Inspecteur de la sécurité de l'aviation civile |
Civil aviation safety inspector
Aviation Manufacturing | Construction Aéronautique
(514) 633-3908| facsimile | télécopieur (514) 633-3361
e-mail | courriel : lachaps@tc.gc.ca
Transport Canada | Transports Canada
700 Leigh Capreol (NAMJ), Dorval, Québec H4Y 1G7
< <<http://www.tc.gc.ca/>>>
Government of Canada | Gouvernement du Canada
P Avez-vous vraiment besoin d'une copie imprimée? Do you really need a printed copy?

U.S.

signed copy for transfer

United States of America

Department of Transportation -- Federal Aviation Administration

Supplemental Type Certificate

IMPORT

Number SR02432NY

This certificate issued to Helitowcart (Vanair Inc.)
877A, Alphonse-Desrochers
Saint-Nicholas, Lévis, Québec
Canada G7A 5K6

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of * *of the* * *Regulations.*

Original Product - Type Certificate Number: *

Make: *

Model: *

* See attached FAA Approved Model List (AML) No. SR02432NY for the list of approved aircraft models, applicable airworthiness regulations, and required documents.

Description of Type Design Change:

1. Installation of Helitowcart Bear Paw Models BP350, BP44 or BP130 in accordance with Helitowcart Master Document Lists as specified in AML SR02432NY.
2. Instructions for Continued Airworthiness documents as specified in AML SR02432NY are required with this installation.

Limitations and Conditions:

1. A copy of this certificate and FAA AML No. SR02432NY must be maintained as part of the permanent records of this modified aircraft.
2. The Installer must determine whether this design change is compatible with previously approved modifications.
3. If the holder agrees to permit another person to use this certificate to alter a product, the holder must give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: March 26, 2007

Date of issuance: July 20, 2007

Date reissued:

Date amended: January 14, 2013, June 3, 2014

By direction of the Administrator

FEDERAL AVIATION ADMINISTRATION

(Signature)

Gaetano Sciortino
Manager, New York
Aircraft Certification Office

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Regional Office of the transfer of the Supplemental Type Certificate.

The FAA will reissue the certificate in the name of the transferee and forward it to him.

TRANSFER ENDORSEMENT

Transfer the ownership of Supplemental Type Certificate Number SR02432 NY

to (*Name of transferee*) Aero Design Ltd.

(*Address of transferee*) 9888 A Malaspina Rd.
(*Number and street*)
Powell River, BC, Canada, V8A 0G3
(*City, State, and ZIP code*)

from (*Name of grantor*)(*Print or type*): Helitowcart (Canair Inc)

(*Address of grantor*): 877 A Alphonse-Desrochers
(*Number & street*)
Saint-Nicolas, Lévis, Quebec, Canada, G7A 5K6
(*City, State, and ZIP code*)

Extent of Authority (if licensing agreement): _____

Date of Transfer: 2018-04-11
(y - m - d)

Signature of grantor (*In ink*): _____
Jacob Chiasson
CEO. Accountable executive

FAA APPROVED MODEL LIST (AML) NO. SR02432NY
HELITOWCART (VANAIR, INC.)
FOR
INSTALLATION OF BEAR PAWS

Original Issue Date: July 20, 2007
Amended Date: June 3, 2014

PART	REGULATION	MAKE	MODEL	TCDS	REQUIRED DOCUMENTATION			AML AMENDMENT DATE
					MASTER DOCUMENT LIST	INSTALLATION INSTRUCTIONS	INSTRUCTIONS for CONTINUED AIRWORTHINESS	
27	Federal Aviation	Airbus Helicopters	AS350B, B1, B2, B3, BA, D, D1	H9EU	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP-AS350/355-1000 Rev. G, approved on December 21, 2012 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - AS350/355, Bear Paw Model BP350, document no. 314-0020-00-E, Rev. F, approved on December 21, 2012 or later Transport Canada approved revision.	Contained within Installation Instructions, page 8 of document no. 314-0200-00-E, Revision F.	June 3, 2014
27	Federal Aviation	Airbus Helicopters	EC 130B4	H9EU	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP-EC130-1000 Rev A, approved on May 13, 2011 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions – EC130, Bear Paw Model BP130, document no. 314-0031-00-A, Rev. A, approved May 4, 2011 or later Transport Canada approved revision	Contained within Installation Instructions, page 6 of document no. 314-0031-00-A, Revision A.	June 3, 2014
27	Federal Aviation	Airbus Helicopters	AS355E, F, F1, F2, N	H11EU	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP-AS350/355-1000 Rev. G, approved on December 21, 2012 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - AS350/355, Bear Paw Model BP350, document no. 314-0020-00-E, Rev. F, approved on December 21, 2012 or later Transport Canada approved revision.	Contained within Installation Instructions, page 8 of document no. 314-0200-00-E, Revision F.	June 3, 2014
27	Federal Aviation	Robinson Helicopter Company	R44, R44 II	H11NM	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP-R44-1000 Rev. D, approved on August 28, 2013 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - R44/R66, Bear Paw Model BP44, document no. 314-0011-00, Rev. E, approved on August 9, 2013 or later Transport Canada approved revision.	Contained within Installation Instructions, page 6 of document no. 314-0011-00, Rev. E.	June 3, 2014

FAA APPROVED MODEL LIST (AML) NO. SR02432NY
HELITOWCART (VANAIR, INC.)
FOR
INSTALLATION OF BEAR PAWS

Original Issue Date: July 20, 2007
Amended Date: June 3, 2014

PART	REGULATION	MAKE	MODEL	TCDS	REQUIRED DOCUMENTATION			AML AMENDMENT DATE
					MASTER DOCUMENT LIST	INSTALLATION INSTRUCTIONS	INSTRUCTIONS for CONTINUED AIRWORTHINESS	
27	Federal Aviation	Robinson Helicopter Company	R66	R00015LA	Helitowcart Inc. Master Document List, Report no. HTC-MDL-BP-R44-1000 Rev. D, approved on August 28, 2013 or later Transport Canada approved revision.	Helitowcart Inc. Installation Instructions - R44/R66, Bear Paw Model BP44, document no. 314-0011-00, Rev. E, approved on August 9, 2013 or later Transport Canada approved revision.	Contained within Installation Instructions, page 6 of document no. 314-0011-00, Rev. E.	June 3, 2014

FAA Approved:

Gaetano Sciortino
Manager, New York
Aircraft Certification Office

EURO

HLST.

HELI TOW CART BY VANAIR

314-0016-05-C
BearPaw
Heat Shrink Installation

1- Install Shrink:

- Prepare Heat Shrink:

  BP44 & BP66:
  Use 1.5" wide shrink. Cut to 5.5" length.

  BP350 & BP130:
  Use 1.5" wide shrink. Cut to 6.75" length.

- Insert U clips into shrink.
- Set U clips standing or on their side on aluminum sheet on cookie pan.
- Heat in oven at 350F for approx. 5 minutes or until shrink is tightly resting against stainless steel on its whole surface.

Nature modifications: Complete update of instruction

P. Boulay 20170801

t: 1-418-561-4512, 877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada G7A 5K6
www.helitowcart.com info@helitowcart.com

SPECS

HTC-MDL-BP-R44-1000 Rev E

HELI TOW CART BY VANAIR

Master Document List

Helitowcart

Robinson R44/R66 Helicopters
Installation of BearPaw Model BP44

Report: HTC-MDL-BP-R44-1000 (Rev E)

APPROVED BY: _____ DATE: 2016-05-30

Mirko Zgela
Design Approval Representative DAR #310

Documents in this manual section are presented in the same order as the TDH list. →

D. Bathalie

D. Bathalie 20160622

Tel 1-418-561-4512, Fax: 1-418-836-4575, info@helitowcart.com www.helitowcart.com
877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada, G7A 5K6

HELI TOW CART BY VANAIR

Revision	Revision Date	Revision of Entry	Entered by
E	2016-05-30	Changed manufacturing tolerances on BearPaw Pad	R. Berthelot
D	2013-08-28	Addition of Robinson R66 helicopter to the fleet eligibility list for BearPaw BP44 and product refinement.	R. Berthelot
C	2010 04 15	Addition of a rear U shaped clip in the streamline BearPaw Pad configuration	S. Bernier
B	2009 10 22	Introduction of new streamline BearPaw Pad configuration as alternate	S. Bernier
A	2006 09 07	Drawings are added to include the provision of shims during the installation.	N. Barbeau

Tel 1-418-561-4512, Fax: 1-418-836-4575, info@helitowcart.com www.helitowcart.com
877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada, G7A 5K6

HELI TOW CART BY VANAIR

1.0 MASTER DOCUMENTS

Document #	Title	Revision Status	Approval by	Date
AAC-CPL-BP-R44-1000 *	Compliance Plan - Robinson R44/R66 Helicopters -Installation of Bear Paw Model BP44	A	DAR 310	Aug 28, 2013
314-0011-00	BearPaw Model BP44 – Installation Instructions - R44/R66	E	DAR 310	Aug 9, 2013
ATS-0709-FTP-1000	R66 BearPaw Installation - Flight Test Plan/Report	NC	DAR 310	Aug 27, 2013
ATS-0709-TM-1000	Structural Substantiation – Addition of R66 Helicopter	NC	DAR 310	Aug 9, 2013
ATS-0709-EO-1000	Engineering Order – Installation of all BearPaw BP44 Configurations on R66	NC	DAR310	Aug 9, 2013
ATS-EO-BP-R44-1000	Engineering Order - BearPaw Streamline BP44	NC	DAR 310	Apr 15, 2010
HTC-TM-BP-R44-1000 *	Structural Substantiation - BearPaw Streamline BP44	NC	DAR 310	Oct 22, 2009
AAC-FTR-C-FBLO *	Simple External Modification – Applicant's Flight Test Plan/Report	NC	DAR 310	Aug 4, 2006
AAC-STR-BP-R44-1000 *	Structural Substantiation – Helitowcart Inc. BearPaw Model BP44	NC	DAR 310	July 4, 2006

2.0 MASTER DRAWINGS

Drawings #	Title	Revision Status	Approval by	Date
112-0001-00	BearPaw – Assembly	F	DAR 310	Aug 9, 2013
314-0001-01	BearPaw – Pad	D	DAR 310	May 30, 2016
314-0002-15	BearPaw – Iceblade	B	DAR 310	Aug 9, 2013
314-0004-15	BearPaw – Iceblade Threaded Rod	B	DAR 310	Aug 9, 2013
314-0005-15	BearPaw – Iceblade Assembly	B	DAR 310	Aug 9, 2013
314-0006-15	BearPaw – U-Shaped Clip	C	DAR 310	Aug 9, 2013
314-0012-01	Filler Block 1/4"	B	DAR 310	Aug 9, 2013
314-0014-01	Filler Block 1/16"	B	DAR 310	Aug 9, 2013
314-0015-01	Filler Block 1/8"	B	DAR 310	Aug 9, 2013
314-0022-01	Filler Block Rear	B	DAR 310	Aug 9, 2013
314-0023-15	BearPaw – Low U-Shaped Clip	B	DAR 310	Aug 9, 2013

Tel 1-418-561-4512, Fax: 1-418-836-4575, info@helitowcart.com www.helitowcart.com
877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada, G7A 5K6

* IN THE HANDS OF MIRKO IGELA ONLY.
& TC

3.0 REFERENCE DOCUMENTS

Document #	Title	Revision Status	Approval by	Date
314-0008-01	Material Properties - UHMW TIVAR	A	N/A	May 24, 2006
314-0009-01	Ultra High Molecular Weight Polyethylene – Typical Properties	A	N/A	May 24, 2006
314-0017-05	Heat Shrink Specifications	A	N/A	Sept 6, 2006

Tel 1-418-561-4512, Fax: 1-418-836-4575, info@helitowcart.com www.helitowcart.com
877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada, G7A 5K6

AAC-CPL-BP-R44-1000
rev. A
Aug 28, 2013
COMPLIANCE PLAN - ROB R44/R66 Heli.
INSTALL. OF BP44

Aviatech
SERVICES TECHNIQUES Inc.

Trois-Rivières, 27 novembre, 2013

Projet: A2007-09

Nathalie Barbeau
VP Commercial Affairs
Helitowcart (Vanair inc.)
877a Alphonse-Desrochers
St-Nicolas, Levis
Québec, Canada
G7A 5K6

• One of the documents none available due to intel. property issue with Aviatech
NR

Objet: STC SH06-24 Issue #4 - Documentation complémentaire

Madame,

Pour des raisons de propriété intellectuelle, certains des documents de la Master Document List HTC-MDL-BP-R44-1000 révision D ne font pas partie du DVD client. Si vous avez besoin de ces documents, vous pouvez vous les procurer en contactant Aviatech Services Techniques ou Transport Canada aux coordonnées suivantes :

Aviatech Services Techniques	**Transport Canada**
2595 St-Olivier	Services de l'aviation civile
Trois-Rivières (Québec)	700, Place Leigh-Capreol
G9A 4G1	Dorval (Québec)
819-601-8049	H4Y 1G7
Contact : Mirko Zgela (Président)	1-800-305-2059

Dans l'éventualité ou Aviatech Services Techniques cesserait ses activités, toute la documentation serait encore disponible à Transport Canada.

Sincèrement,

Mirko Zgela
Design Approval Representative DAR #310

Aviatech Services Techniques Inc.
2595, rue St-Olivier
Trois-Rivières, Québec, G9A 4G1
Tel: (819) 601-8049 Fax: (819) 377-7928
Courriel: info@ats-ast.com
Site internet: www.ats-ast.com

AAC-CPL-BP-R44-1000

Aviatech Airworthiness Consultants
4100 Renoir
Trois-Rivières, (QC)
G8Y 6Y6

Aviatech Airworthiness Consultants

Compliance Plan
Robinson R44 Helicopters
Installation of BearPaw Model BP44

Report: HTC-CPL-BP-R44-1000 (Rev NC)

APPROVED BY: Mirko Zgela

Mirko Zgela
Design Approval Repres

Awaiting for new version:

Rev A, Aug 28, 2013

2017 06 01

NOTE: UNABLE TO ACCESS VERSION "A" / INTELLECTUAL PROPERTY ISSUE

REASON: THIS DOCUMENT IS UNDER A CONIDENTIALITY STATUS. IT IS ONLY AVAICABLE TO TRANSPORT CANADA OTHER THAN THE ISSUER DAR #310, MIKO ZGELA.

*I THINK WE HAVE THE ORIGIPAL "NC" VERSION BY ACCIDENT...

D. Baulac

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1.2 ORIGINAL TYPE CERTIFICATE 2
1.3 MODIFICATION DESCRIPTION 2
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1.5 AFFECTED REGISTRATION AND SERIAL 3

2.0 COMPLIANCE STATEMENTS **4**

1.0 INTRODUCTION

1.1 Purpose

This compliance plan establishes for the, Robison Helicopter Models R44 the methods by which Aviatech Airworthiness Consultants proposes to show compliance for the fabrication and installation of the Helitowcart BearPaw.

1.2 Original Type Certificate

The Type Certificate Data Sheet H11NM provides the Basis of Certification for the Robison Helicopters model R44. The helicopter types have been certified to FAR 27. The latest amendment of the AWM 527 will be used as the basis of certification for this modification.

1.3 Modification Description

The Helitowcart BearPaw is made of machined UHMW TIVAR® polymer 0,025 in. sheet material. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability provides superior performance. The UHMW Polymer has a lower coefficient of friction than glass. Together with its self lubricating characteristics is an ideal material for this design application where sliding contact is encountered.

The machined BearPaw is attached to the R/H and L/H helicopter aft skid tubes where the aft cross tube attaches. The BearPaw is attached to the skids using two stainless steel bands and fours AN-4 bolts. The BearPad pad has a machine recess that perfectly matches the cross tube contour providing a smooth skid load bearing. The total weight of the installation is less than 6 lbs. A typical BearPaw Model BP44 installation on a Robinson R44 helicopter is shown in Figure (1).

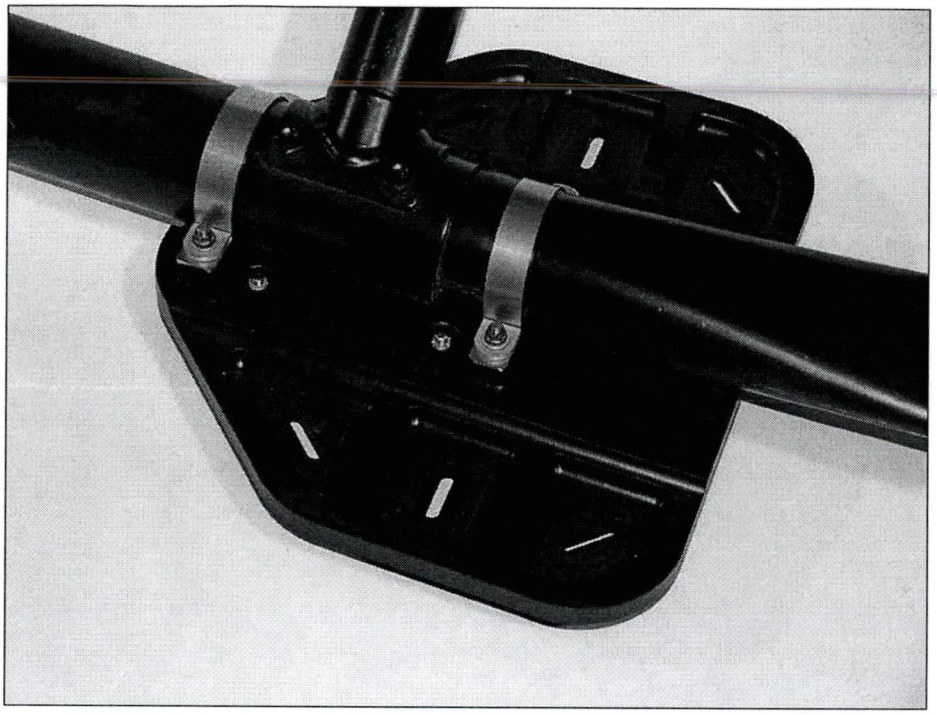

Figure (1) – Installation of BearPaw Model PB44 on R44 Helicopter

1.4 Effect of Changes

The BearPaw will have a negligible effect the aircraft performance. The installation instructions provided with each kit give Weight and Balance information pertinent to the modification.

1.5 Affected Registration and Serial

This modification is to be installed on any of the following Robinson Helicopters:

A/C Model	Ser #	TCDS
R44	0271 thru 9999	H11NM
R44 II	1140, 10001 and subsequent	H11NM

2.0 COMPLIANCE STATEMENTS

Requirement	Title/Content	Compliance		Comments	Approval by	Signature
		Method	Document #			
AWM 527	**Subpart A Airworthiness Requirements**					
27.2	Special retroactive requirements			This modification has no impact on the special retroactive requirements	DAR 310	(1)
	Subpart B Flight Requirements					
27.29	Empty weight and corresponding center of gravity	Engineering Document	HTC-314-0011-00-A Rev A, dated June 12, 2006	A W&B information is provided in the Installation Instructions	DAR 310	(1)
27.251	Vibration	Test	FTR – C-FBLO dated Aug 4, 2006		DAR 310	(1)
	Subpart C Strength Requirement					
27.301	Flight Loads	Analysis	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006		DAR 310	(1)
27.303	Factor of Safety	Analysis	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006		DAR 310	(1)
27.305	Strength & Deformation	Analysis	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006	The analysis has shown that the BearPaw strength and deformation are deemed acceptable.	DAR 310	(1)
27.307	Proof of Structure	Analysis	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006		DAR 310	(1)
27.309	Design Limitations (c) & (d)	Test	FTR – C-FBLO dated Aug 4, 2006		DAR 310	(1)
27.321	General	Analysis	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006		DAR 310	(1)

		Compliance				
27.337	Limit Maneuvering Load Factor	Analysis	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006		DAR 310	(1)
27.501	Ground Loads Conditions – Landing Gear with Skids	Analysis	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006	A suitable set of design loads have been derived for the BearPaw.	DAR 310	(1)
	Subpart D Design & Construction					
27.603	Material	Engineer Document	AAC-STR-BP-R44-1000, Rev NC dated July 4, 2006	The LEXAN material used in the floor protector fabrication is widely used in the industry and has well defined properties. with	DAR 310	(1)
27.605	Fabrication Methods	Statement		The BearPaw are fabricated using standard machining technique..	DAR 310	(1)
27.607	Fasteners	Design	Drawing VNR083, R03, Dated April 24, 2006	Only aerospace fasteners have been used.		
27.609	Protection of structure	Statement		The BearPaw material used is highly durable and cannot corrode.	DAR 310	(1)
27.611	Inspection provisions	Engineering Document	HTC-314-0011-00-A Rev A, dated June 12, 2006	The BearPaw Installation Instruction provides all the necessary provisions for inspection and continuous airworthiness. .	DAR 310	(1)
27.619	Special Factor	N/A				
27.621	Casting Factor	N/A				
27.623	Bearing Factor	N/A				
27.625	Fitting Factor	N/A				
27.629	Flutter	Test	FTR – C-FBLO dated Aug 4, 2006		DAR 310	(1)

Note (1): Compliance signature provided in DAR #310, Project# 2006-02 AE-100/01

*ADDED R66

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Annex A (BearPaw Assembly Drawing)
Annex B (BearPaw Pad Allowable Damage Drawing)

FOR: NEW R44-66 BATCH

WITH CAN STC only Yet

Tel: 1-418-561-4512, Fax: 1-418-836-4575, 877 A Alphonse-Desrochers, St-Nicolas, Levis, QC, Canada, G7A 5K6.
www.helitowcart.com info@helitowcart.com

INTRODUCTION

Scope

This installation instruction describes the step-by-step approach to install and to perform maintenance of the Helitowcart BearPaw BP44 on the Robinson R44 and R66 helicopters..

General

The Helitowcart BearPaw is made of machined UHMW TIVAR® polymer sheet. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability will provide superior performance to your Robinson helicopter. Any question regarding the Helitowcart BearPaw system shall be directed to Helitowcart Customer Support as indicated in Table 1:

Table 1 – Helitowcart Customer Support

Care of	Mailing Address	Phone, Fax & Email:
Customer Support Helitowcart BearPaw Helitowcart (Vanair inc)	877 A, Alphonse-Desrochers, St-Nicholas, Levis, Quebec, Canada, G7A 5K6	Tel:1 (418) 561-4512 Fax:1 (418) 836-4575 info@helitowcart.com

Helicopter Effectivity

This installation instruction applies to the following ROBINSON Helicopters:

Table 2 – Robinson Helicopter Effectivity

A/C Model	Serial no.	Type Certificate Data Sheet
R44	0002, 0004 thru 9999, except 1140	Transport Canada: H-97 FAA: H11NM
R44 II	1140, 10001 and subsequent	Transport Canada: H-97 FAA: H11NM
R66	0002 and subsequent	Transport Canada: H-111 FAA: R00015LA

Installer Responsibilities

The installer shall ensure that the installation of the Helitowcart BearPaw does not conflict with any other part of the helicopter configuration. Technicians performing this installation should be familiar with A/C work and should have been familiarized with the different Helitowcart BearPaw system components prior to performing a first time installation. All steps in this procedure must be followed. Deviations from the procedures may result in potential structural failure or equipment malfunction and will result in a non-compliant installation.

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INSTALLATION

BearPaw Installation

Reference Documentation:

[1] Robinson R44 – Maintenance Manual & Instruction for Continued Airworthiness. RTR460.
[2] Robinson R66 – Maintenance Manual & Instruction for Continued Airworthiness. RTR660.
[3] Annex A – BearPaw Assembly Drawings (112-0001-00)

Step 1: Helicopter Preparation

- Ensure the helicopter is safe for maintenance;
- Lift the helicopter using the manufacturer recommended practice provided in Ref [1] or [2] to allow a clearance of the skid in the area of the aft cross tube of approximately 1 ½ inch (38mm);
- Remove aft skid wearshoe & re-install the attaching screws.

Step 2: Ice Blade Installation (Optional)

- Install the two ice blades (314-0005-15) under BearPaw pad as per drawing 112-0001-00, ref [3];
- Insert washer (263-0001-17 / AN960-416) through threaded part of ice blade and secure with nut (262-0001-17 / AN365-428A).

Step 3: BearPaw Preparation

- Insert washers (263-0001-17 / AN960-416) through all six bolts: 2x(261-0001-17 / AN4-14A), 2x(261-0002-17 / AN4-15A) & 2x(261-0003-17 / AN4-16A) as per drawing 112-0001-00, ref [3];
- Insert all six bolts and washers through BearPaw pad;
- Insert rear filler block (314-0014-01) at aft of BearPaw;
- On each side at **front** of BearPaw, insert one 1/4" filler block (314-0012-01) and one 1/16" filler block (314-0014-01);
- On each side at **center** of BearPaw, insert one 1/8" filler block (314-0015-01) and one 1/16" filler block (314-0014-01);
- On each side at **aft** of BearPaw, insert **two** 1/16" filler blocks 2x(314-0014-01);

Note: Except for the rear filler block (314-0022-01) the use of filler blocks mentioned above may be increased, decreased, replaced or complemented by the use of washers (263-0001-17 / AN960-416). The use of bolts mentioned above may be replaced by longer or shorter AN4 bolts as required.

Step 4: BearPaw Installation

- Position the BearPaw under skid at the aft intersection with the cross tube with narrow edge pointing forward.
- Insert both U-Shaped Clips (314-0006-15) through bolts at front and center of BearPaw as per drawing 112-0001-00, ref [3];
- Insert the Low U-Shaped Clip (314-0023-15) through bolts at rear of BearPaw;
- Insert washer (263-0001-17 / AN960-416) & screw nuts (262-0001-17 / AN365-428A) for a tight fit. Maximum torque on nuts is 60 in.-lb.
- Adjust rear filler block (314-0022-01) position using slotted holes to remove all gap between rear filler block and skid.
- Ensure BearPaw holds strongly into position. If required, 1/16" filler blocks (314-0014-01) can be removed to increase tightening.

Step 5: Final Step

- Remove helicopter from lift;
- Amend Weight & Balance records as required using data provided in Table 3.

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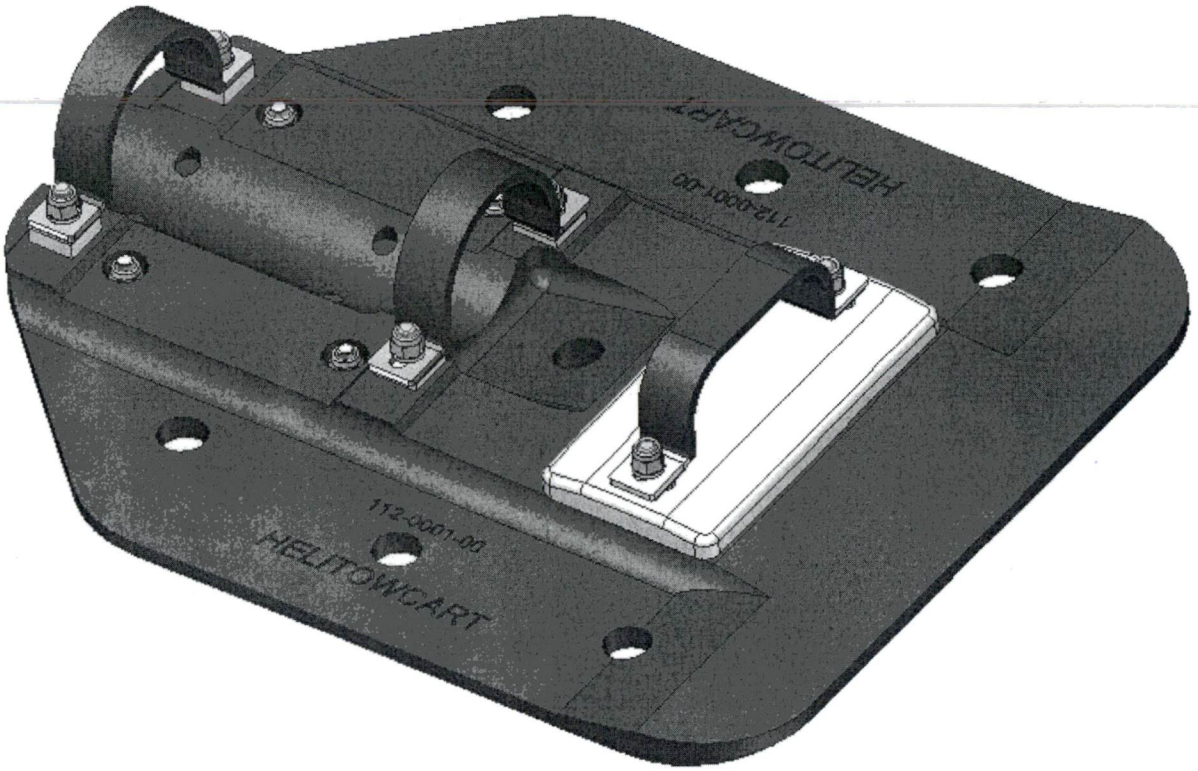

Figure 1 – BearPaw Model BP44/BP66 (112-0001-00)

BearPaw Removal

Step 1: Helicopter Preparation

- Ensure the helicopter is safe for maintenance;
- Lift the helicopter using the manufacturer recommended practice provided in Ref [1] and [2] to allow a clearance of the skid in the area of the aft cross tube of approximately 1 ½ inch (38mm);

Step 2: BearPaw Removal

- Remove nuts (262-0001-17 / AN365-428A), washers (263-0001-17 / AN960-416), U-Shaped Clips (314-0006-15) and Low U-Shaped Clip (314-0023-15);
- Remove BearPaw pad (314-0001-01);
- Inspect skid tubes to confirm serviceability;
- Re-install aft wearshoe with screws as per reference [1] or [2];
- Complete installation by putting helicopter back to normal position by removing lift status;
- Amend Weight & Balance records as required.

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Weight & Balance

The following information should be used to amend the helicopter weight and balance information following the installation or removal:

Table 3 – Weight & Balance Data – R44, R44 II and R66 helicopters

Item	Weight	Lateral		Longitudinal	
		Arm	Moment	Arm	Moment
Helitowcart BearPaw Model BP44	10.0 lbs 4.54 kg	0.0 in. (0.00 m)	0.0 lbs-in (0.0 kg-m)	128.5 in (3.26 m)	1285 lbs-in (14.8 kg-m)

Parts Lists

The Helitowcart BearPaw detailed part list is as follow:

Table 4 – Parts List

Description	Qty	Part No.	Name
BearPaw Model BP44	**1**	**112-0001-00**	**BearPaw Assembly**
BearPaw pad	1	314-0001-01	BearPaw – Pad
Filler blocks rear	1	314-0022-01	BearPaw – Filler block Rear
Filler blocks 1/4"	2	314-0012-01	BearPaw – Filler block 1/4"
U-Shaped Clips	2	314-0006-15	BearPaw – U Shaped Clips
Filler blocks 1/16"	8	314-0014-01	BearPaw – Filler block 1/16"
Filler blocks 1/8"	2	314-0015-01	BearPaw – Filler block 1/8"
Low U-Shaped Clips	1	314-0023-15	BearPaw – Low U Shaped Clips
Washers	12	263-0001-17	Washer (AN960-416)
Nuts	6	262-0001-17	Nylon Nut (AN365-428A)
Bolts	2	261-0001-17	Hex Bolt (AN4-14A).
Bolts	2	261-0002-17	Hex Bolt (AN4-15A).
Bolts	2	261-0003-17	Hex Bolt (AN4-16A).
IceBlade Option Model OIB	**2**	**314-0005-15**	**IceBlade Assembly**
Nuts	4	262-0001-17	Nylon Nut (AN365-428A)
Washers	4	263-0001-17	Washer (AN960-416)

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INSPECTION

Life Limited Items

There are no life limited items for the Helitowcart BearPaw.

Pre-Flight

Before each flight the following items should be inspected:

- Check that attachment bolts are installed and secured;
- Check that BearPaws are free from visible damage;
- If damage is found, verify allowable damage according to:
  Table 5 – Tolerances for Cracks & Wear;
  Annex B – BearPaw Allowable Damage Drawing (314-0001-01 page 3 of 3).

Periodic Inspection Schedule

- The Helitowcart BearPaw shall be inspected every 300 flying hours or yearly whichever comes first;
- The Helitowcart BearPaw can be inspected concurrently with the R44/R66 landing gear inspection;
- Recommended tolerance for performance of inspection is +/- 10% of the 300 hours period.;
- Following an inspection, subsequent interval shall be adjusted to meet the original schedule from time of inspection. If inspection is performed earlier than the 10% tolerance, then following inspections shall be scheduled not to exceed the above mentioned tolerance.

300 Hour or Yearly Inspection Details

- Remove Helitowcart BearPaw: See Section "BearPaw Removal";
- Inspect all parts for damage & wear. See table & figure below for allowable damage;
- Replace all damaged parts;
- Replace parts worn beyond the tolerances indicated below;
- See Tolerances for cracks & wear:
  Table 5 – Tolerances for cracks & wear;
  Annex B – BearPaw Allowable Damage Drawing (314-0001-01 page 3 of 3).

Table 5 – Tolerances for Cracks & Wear

Zone	Nominal Dimension (Inches)	Allowable Damage/Wear (Inches)	Cracks
A	0,350	0,050	
B	1,000	0,250	
C	0,375	0,050	
D	N/A	N/A	No cracks allowed in zone D
E	N/A	N/A	No cracks allowed in zone E

Overhaul Requirements

- Not applicable for the designated application of this device.

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REVISIONS & APPROVAL

Revisions

Date	Rev	Nature of Revisions
August 09, 2013	E	Addition of Robinson R66 helicopter, removal of pocket version of the BearPaw and removal of revision letters from part numbers.
April 15, 2010	D	Addition of a rear U shaped clip in the Streamline BearPaw Pad configuration.
October 22, 2009	C	Introduction of new streamline BearPaw Pad configuration as alternate.
September 7, 2006	B	- Added filler blocks and heat shrink to product list. - Modified recommended bolt models (lengthened) - Revised inspection requirements from 100 hour to 300 hour intervals. - Identification of the IceBlade assembly as an optional feature.
June 12, 2006	A	Initial issue

Approval

Internal Approval :		
Helitowcart inc.	Lucien Barbeau, President	August 09, 2013
External Approval :		
Transport Canada	Mirko Zgela, DAR #310	August 09, 2013

Annex A

See: BearPaw Assembly, drawing no. 112-0001-00.

Annex B

See: BearPaw Allowable Damage Drawing, drawing no. 314-0001-01 page 3 of 3.

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Annex A
BearPaw Assembly, Drawing no. 112-0001-00

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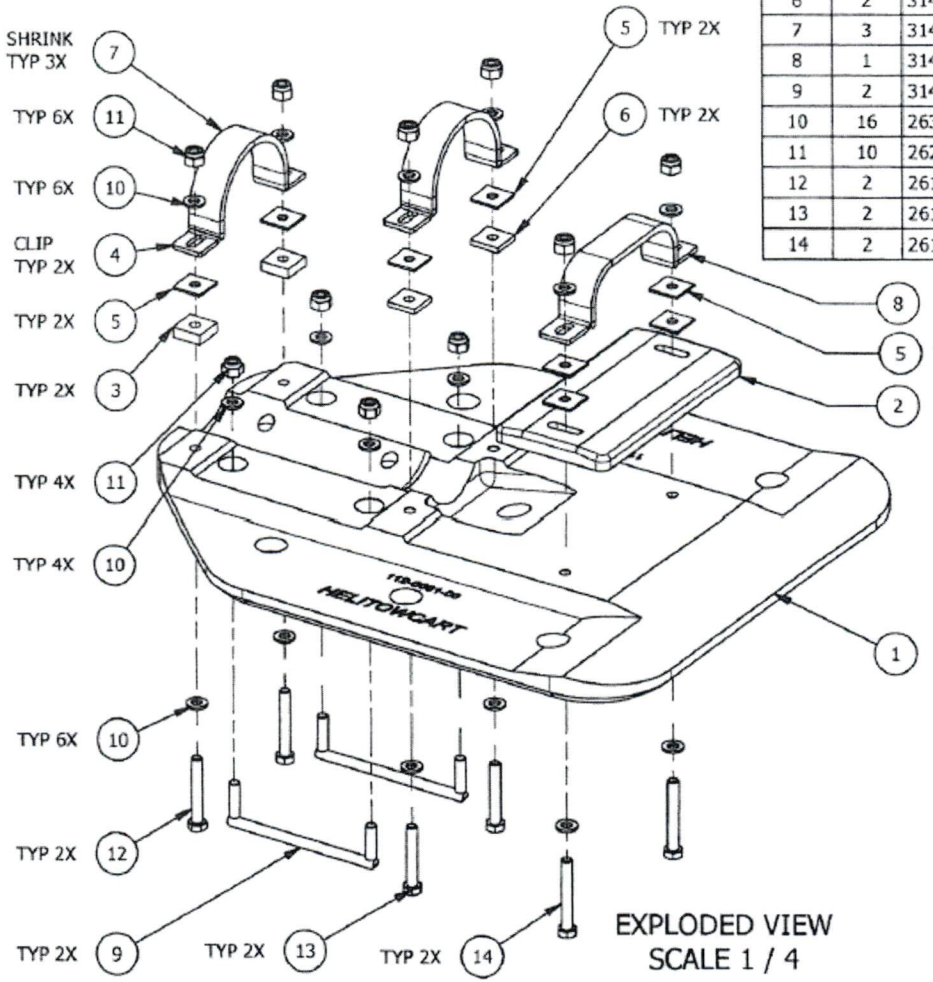
NOTES:

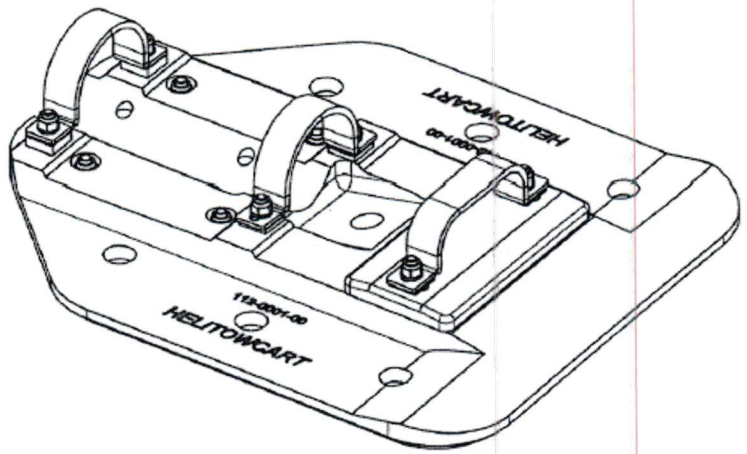
1. ICEBLADE ASSEMBLY CAN BE OMITTED FROM INSTALLATION (OPTIONAL)

2. FASTENERS LENGTH TO BE DETERMINED AT THE INSTALLATION

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0001-01	BEARPAW - PAD	UHMW	---	1" THK.
2	1	314-0022-01	BEARPAW - FILLER BLOCK REAR	UHMW	---	1/2" THK.
3	2	314-0012-01	BEARPAW - FILLER BLOCK 1/4	UHMW	---	1/4" THK.
4	2	314-0006-15	BEARPAW - U SHAPED CLIP	SS304	ANNEALED	GAGE 12
5	8	314-0014-01	BEARPAW - FILLER BLOCK 1/16	UHMW	---	1/16" THK.
6	2	314-0015-01	BEARPAW - FILLER BLOCK 1/8	UHMW	---	1/8" THK.
7	3	314-0016-05	BEARPAW - SHRINK (FIT-221)	POLYOLEFIN	---	1" DIA X 5" LG.
8	1	314-0023-15	BEARPAW - LOW U SHAPED CLIP	SS304	ANNEALED	GAGE 12
9	2	314-0005-15	ICEBLADE ASSEMBLY	STEEL	---	---
10	16	263-0001-17	WASHER (AN960-416)	STEEL	---	1/4
11	10	262-0001-17	NYLON NUT (AN365-428A)	STEEL	---	1/4
12	2	261-0002-17	HEX BOLT (AN4-15A)	STEEL	QQ-P-416A	1/4-28
13	2	261-0001-17	HEX BOLT (AN4-14A)	STEEL	---	---
14	2	261-0003-17	HEX BOLT (AN4-16A)	STEEL	QQ-P-416A	1/4-28



EXPLODED VIEW
SCALE 1 / 4



ASSEMBLED
SCALE 1 / 4

REVISION

REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	ISSUE FOR PRODUCTION	G.LAPOINTE	M. ZGELA	2006-04-25
B	MODIFY BOLT MODEL AND ADD FILLER BLOCK	G.LAPOINTE	M. ZGELA	2006-08-08
C	MODIFY BOLT MODEL AND ADD FILLER BLOCK AND SHRINK	G.LAPOINTE	M. ZGELA	2006-09-06
D	ADDITION OF STREAMLINE PAD CONFIGURATION	S.BERNIER	M. ZGELA	2009-10-22
E	ADDITION OF A REAR U SHAPED CLIP	S.BERNIER	M. ZGELA	2010-04-15
F	MODIFICATION OF LOW U SHAPED CLIP AND REAR FILLER BLOCK	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE — DATE: 2006/04/25
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2006/04/25
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW ASSEMBLY
DRAWING NUMBER: 112-0001-00
REV: F
SHEET: 1 OF 1

Annex B
BearPaw Allowable Damage Drawing, Drawing no. 314-0001-01-B, Page 3 of 3

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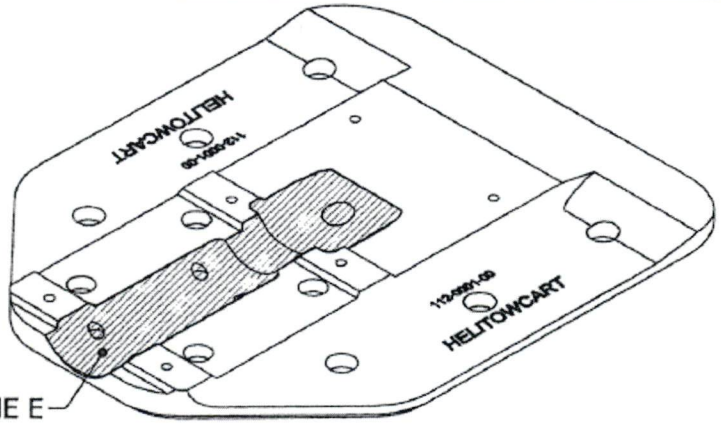

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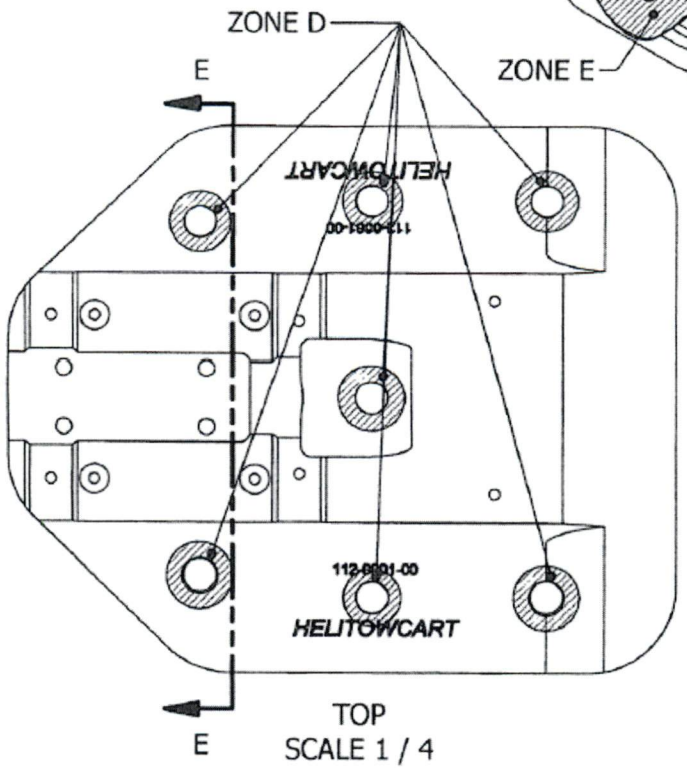

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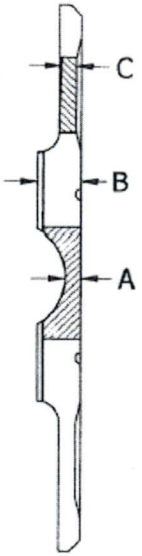

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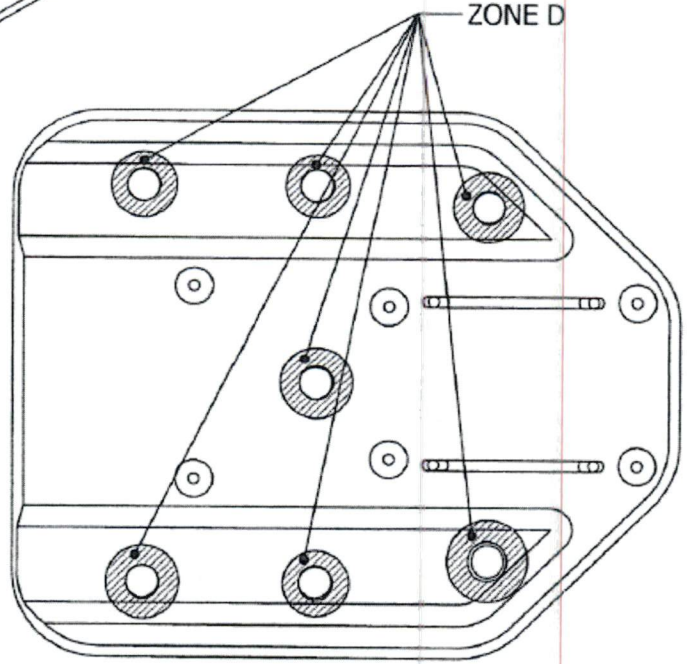

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DRAFTED BY: G. LAPOINTE	DATE: 2006-04-24	
CHECKED BY:	DATE:	DEFINITION: BEARPAW PAD
APPROVED TCCA BY: M. ZGELA	DATE: 2006-04-24	
IF NOT SPECIFIED GENERAL TOLERANCE	UNITS: INCH	DRAWING NUMBER: 314-0001-01 REV C
1/X ± 1/32 X.XX ± 0.010" X.XXX ± 0.005" ANG. ± 1°	SIZE A	
	SCALE: N/A	SHEET: 3 OF 3

ATS-0709 - FTP-1000 rev NC
Aug 27, 2013
R66 Bearpaw Installation - Flight Test Plan / Report

Aviatech
SERVICES TECHNIQUES inc.

Trois-Rivières, 27 novembre, 2013

Projet: A2007-09

Nathalie Barbeau
VP Commercial Affairs
Helitowcart (Vanair inc.)
877a Alphonse-Desrochers
St-Nicolas, Levis
Québec, Canada
G7A 5K6

- one of the documents not available due to intellectual property issues with Aviatech. As confirmed in this letter. ND

Objet: STC SH06-24 Issue #4 - Documentation complémentaire

Madame,

Pour des raisons de propriété intellectuelle, certains des documents de la Master Document List HTC-MDL-BP-R44-1000 révision D ne font pas partie du DVD client. Si vous avez besoin de ces documents, vous pouvez vous les procurer en contactant Aviatech Services Techniques ou Transport Canada aux coordonnées suivantes :

Aviatech Services Techniques	**Transport Canada**
2595 St-Olivier	Services de l'aviation civile
Trois-Rivières (Québec)	700, Place Leigh-Capreol
G9A 4G1	Dorval (Québec)
819-601-8049	H4Y 1G7
Contact : Mirko Zgela (Président)	1-800-305-2059

Dans l'éventualité ou Aviatech Services Techniques cesserait ses activités, toute la documentation serait encore disponible à Transport Canada.

Sincèrement,

Mirko Zgela
Design Approval Representative DAR #310

Aviatech Services Techniques Inc.
2595, rue St-Olivier
Trois-Rivières, Québec, G9A 4G1
Tel: (819) 601-8049 Fax: (819) 377-7928
Courriel: info@ats-ast.com
Site internet: www.ats-ast.com

ATS-0709-TM-1000
rev. NC
Aug 9, 2013

Aviatech
SERVICES TECHNIQUES Inc.

STRUCTURAL SUBSTANTIATION - ADDITION OF K66

Trois-Rivières, 27 novembre, 2013

Projet: A2007-09

Nathalie Barbeau
VP Commercial Affairs
Helitowcart (Vanair inc.)
877a Alphonse-Desrochers
St-Nicolas, Levis
Québec, Canada
G7A 5K6

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Trois-Rivières (Québec)	700, Place Leigh-Capreol
G9A 4G1	Dorval (Québec)
819-601-8049	H4Y 1G7
Contact : Mirko Zgela (Président)	1-800-305-2059

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Sincèrement,

Mirko Zgela
Design Approval Representative DAR #310

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Trois-Rivières, Québec, G9A 4G1
Tel: (819) 601-8049 Fax: (819) 377-7928
Courriel: info@ats-ast.com
Site internet: www.ats-ast.com

ATS-EO-BP-R44-1000 Rev NC ECO 546

Aviatech Technical Services Inc.
3005 rue Lindbergh
Trois-Rivières, Québec
G9A 5E1

Engineering Order

Title: Engineering Order - BearPaw Streamline BP44				EO# ATS-EO-BP-R44-1000 Rev NC	
Prepared by: S. Bernier	**Design:** N/A	**Mech:** N/A	**Stress:** N/A	**Approved:** Mirko Zgela (DAR #310)	**Date:** Apr 15, 2010
A/C Effectivity R44 R44 II	**Registration:** N/A			**Serial#:** 0271 thru 9999 1140, 10001 and subsequent	

Reference Documents:

[1] Robinson R44 - Maintenance Manual & Instruction for Continued Airworthiness. RTR460
[2] 314-0011-00-A Rev_D BearPaw Model BP44 – Installation Instructions - R44, dated April 15, 2010
[3] AAC-STR-BP-R44-1000, Structural Substantiation – Helitowcart (Vanair Inc.) BearPaw Model BP44, dated July 4, 2006

Applicable Drawings:

[4] 112-0001-00-E BearPaw Streamline Assembly

Background:

The Helitowcart BearPaw is made of machined UHMW TIVAR® polymer sheet. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability will provide superior performance to your Robinson helicopter.

Description of Change:

The BearPaw Streamline Pad (P/N 314-0001001-B) is longer than the original design. An additional support is required to provide added support to the Pad in the unlikely event that a Pad would get stuck into the mud. Figures (1) shows the BearPaw Streamline assembly .

D. Bastien 2010.04.24

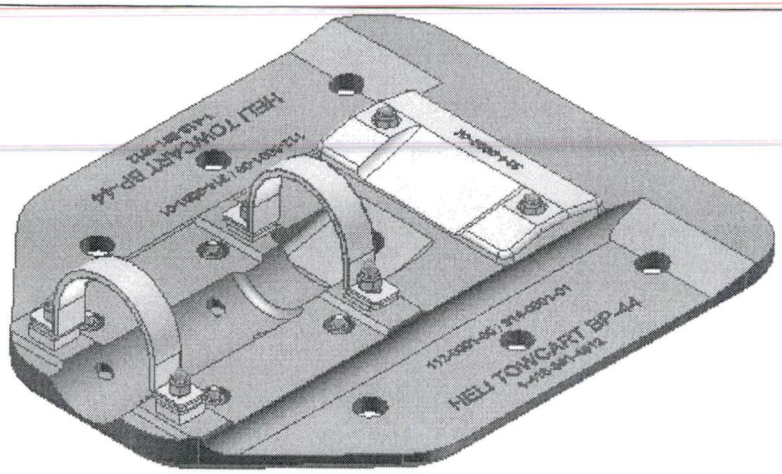

Figure 1 - BearPaw Streamline Assembly

New configuration:

As a preventive measure to reduce the bending moment and the load in the middle U clips during lift-off a U clip is added. Figure 2 shows the new assembly.

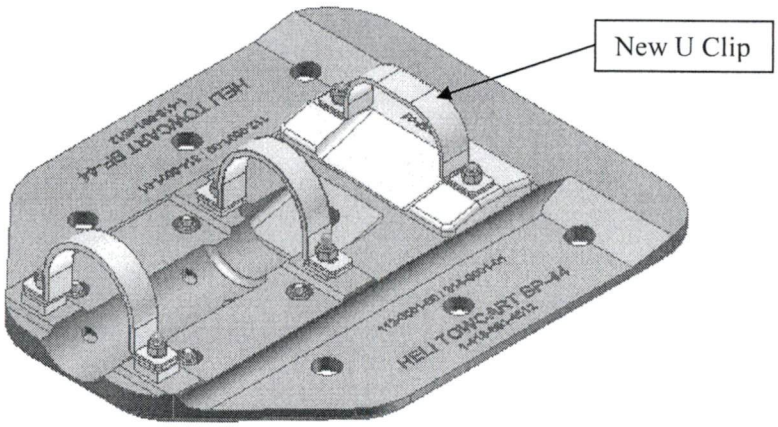

Figure 2 - BearPaw Streamline New Assembly

Structural Analysis:
No additional structural analysis is needed since the two front U clips have proven to take the load during the landing in the document # AAC-STR-BP-R44-1000, Structural Substantiation – Helitowcart (Vanair Inc.) BearPaw Model BP44, dated July 4, 2006.

Aviatech Technical Services Inc.
3005 rue Lindbergh
Trois-Rivières, Québec
G9A 5E1

Installation Instructions:	
1	Install the BearPaw Streamline assembly as per document #314-0011-00, Rev D, BearPaw Model BP44 – Installation Instructions - R44

HTC-TM-BP-R44-1000 Rev NC

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3005 rue Lindbergh
Trois-Rivières, Québec
G9A 5E1

Technical Memorandum

Title: Structural Substantiation - BearPaw Streamline BP44				TM# HTC-TM-BP-R44-1000 Rev_NC	
Prepared by: Simon Bernier	**Design:** Simon Bernier	**Mech:** N/A	**Stress:** Simon Bernier	**Approved:** Mirko Zgela (DAR #310)	**Date:** Oct 22, 2009
A/C Effectivity	**Registration:** N/A			**Serial#:** N/A	

Reference Documents:

[1] 314-0011-00-A Rev C, BearPaw Model BP44 – Installation Instructions - R44, dated Oct 22, 2009
[2] AAC-STR-BP-R44-1000, Structural Substantiation – Helitowcart (Vanair Inc.) BearPaw Model BP44, dated July 4, 2006
[3] 314-0008-01-A, Propriétés de l'UHMW TIVAR, dated May 25, 2006

Applicable Drawings:

[1] 112-0001-01-D, BearPaw Streamline Assembly, dated Oct 22, 2009
[2] 314-0001-01-B, BearPaw – Pad Streamline, dated Oct 22, 2009
[3] 314-0022-01-A, Filler Block Rear, dated Oct 22, 2009

Background:
The Helitowcart BearPaw is made of machined UHMW TIVAR® polymer sheet. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability will provide superior performance to your Robinson helicopter.

Description of Change:
The new Bearpaw Pad (P/N 314-0001-01-B) will be longer and a new profile is made to ensure that no rocks will get in to the top pocket. Figure 1 shows the original pad (P/N 314-0001-01).

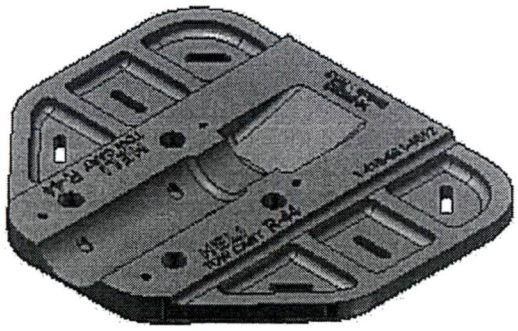

Figure 1 - BearPaw – Pad

New configuration:
Since the pad is longer a filler block will be added for additional support of the load. Figure 2 shows the new Bearpaw Pad Streamline (P/N 314-0001-01-B) with the filler block (P/N 314-0022-01-A).

D. Barbeau
2010.01.06

Aviatech Technical Services Inc.
3005 rue Lindbergh
Trois-Rivières, Québec
G9A 5E1

Figure 2 - BearPaw – Pad Streamline

Structural Analysis:
The load case is taken from report AAC-STR-BP-R44-1000, Structural Substantiation – Helitowcart (Vanair Inc.) BearPaw Model BP44, dated July 4, 2006. Since there are no other parts change in the assembly only the BearPaw Pad needs a new analysis. The analysis is made with Ansys 11.0 Workbench finite element model (FEM) software.

The load (A) of 2640 lbs in the (Z) direction corresponds to the weight of the helicopter equally distributed under the BearPaw. The load (B) of 792.1 lbs in the (-Y) direction corresponds to the friction distributed in the front leading edge. Four pin jointed supports (C) retain the pad in the (±Y) placed in the attachment clip bolt holes and (±X) direction. The frictionless support simulates the skid of the helicopter and retains the pad in the (±Z) direction. Figure 3 shows the initial loading condition.

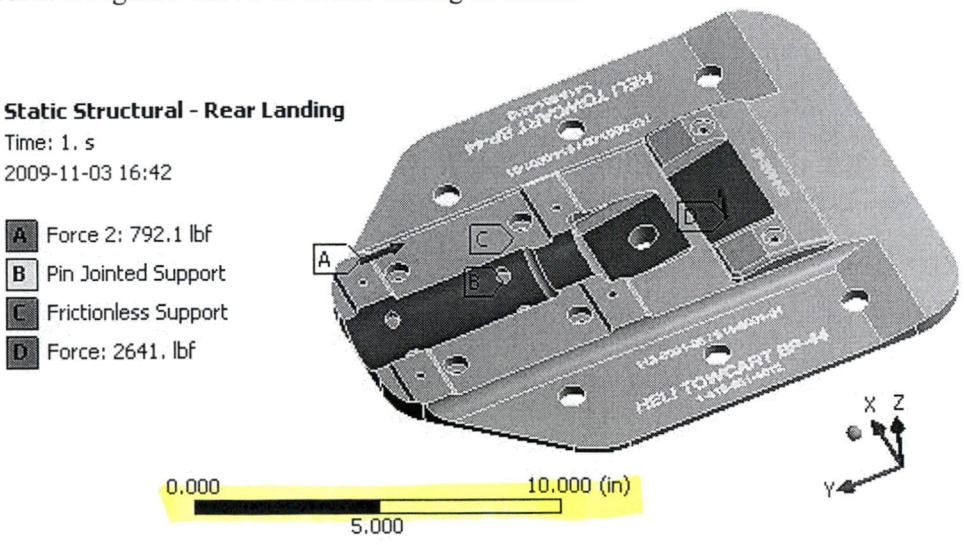

Figure 3 - BearPaw – Pad Streamline FEM Model

The maximum Von Mises stress is 2875 psi compared to the old design of 2600 psi. Figure 4 shows the Von Mises stress map of the BearPaw.

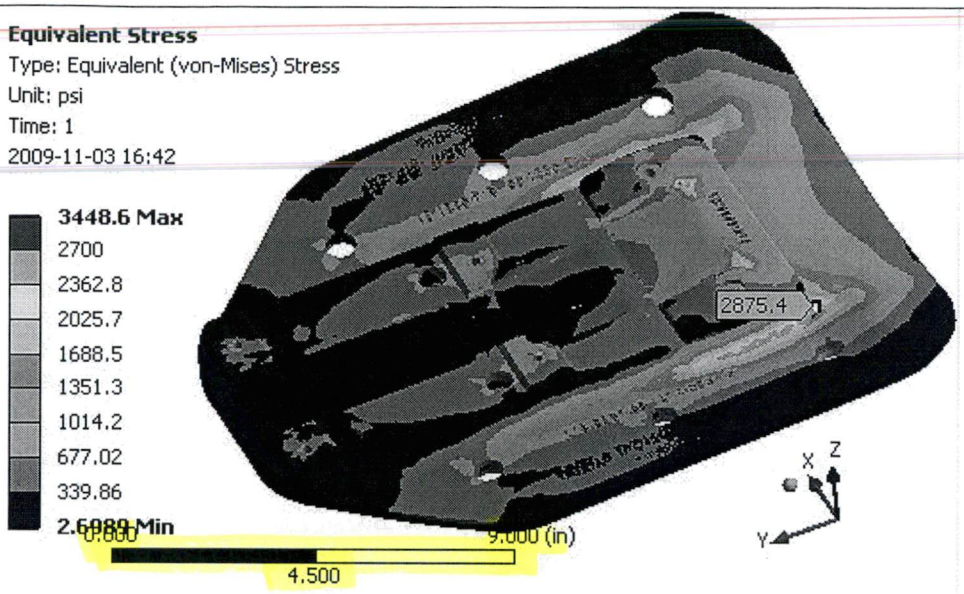

Figure 4 - BearPaw – Pad Streamline Von Mises Stress

As such we have the margin of safety:

MS = (Ftu/(FS x Fvm))-1

Where;

Ftu = Material ultimate tensile strength = 6800 psi [1]
FS = Factor to ultimate load = 1.5
Fvm = Von Mises maximum stress = 2875 psi

MS = 0.57

Conclusion:
The new BearPaw Pad is indeed structurally acceptable since the margin of safety (MS) is superior to "0".

Installation Instructions:	
1	Refer to document 314-0011-00-A Rev C, BearPaw Model BP44 – Installation Instructions - R44, dated Oct 22, 2009

[1] From 314-0008-01-A, Propriétés de l'UHMW TIVAR, dated May 25, 2006

AAC - FTR - C-FBLO
AUG 4, 2006 REV NC

Transport Canada Civil Aviation
LSTC or STC
Simple External Modification - Applicant's Flight Test Plan/Report

Aircraft Type: Robinson Helicopter Model R44 Registration / Ser No: C-FBLO / 11201

Modification Description: Installation of Helitowcart BearPaw as per STC: SH06-24

Modification Drawing Number: Installation performed as per Master Document List, Robinson R44 Helicopters Installation of BearPaw Model BP44, Report: HTC-MDL-BP-R44-1000 (Rev NC) dated Aug 2, 2006

Date of Flight: Aug 4, 2006 Location of Flight: CYQB – Canadian Helicopter

Test Weight: 2090 lbs Test CG: 97.28"

Configuration (List All External Mods): Configuration #1: Clean helicopter (Baseline)

Configuration #2: BearPaw installed as per HTC-314-0011-00-A BearPaw Model BP44 – Installation Instructions, Rev A dated June 12, 2006

Note: Two flights will be required, one clean to be used as baseline the other with the BearPaw installed.

TEST RESULTS

Test	Characteristics to Look For	Initial if Satisfactory
1. 527.309 – Design Limitation (c) & (d)	Perform forward rearward and sideward flight (left & right) at maximum speed. Note the following: - Abnormal vibration of the airframe - Abnormal vibration of BearPaw - Large displacements of BearPaw - Controllability of the helicopter	
2. 527.251 Vibration	Perform forward rearward and sideward flight (left & right) at maximum speed. Note the following: - Abnormal vibration of the airframe - Abnormal vibration of BearPaw - Large displacements of BearPaw - Controllability of the helicopter	
3. 527.629 Flutter	Perform a shallow dive at VNE. Note the following - Abnormal vibration of the airframe and rotor blade - Abnormal vibration of BearPaw - Large displacements of BearPaw - Controllability of the helicopter	

I hereby attest that I have flown (Model) Model R-44 (Registration) C-FBLO (Serial Number) 11201 with the above modification(s) installed and that this aircraft exhibited the flight characteristics and performance of a standard R-44 when the modified with the above modification.

Pilot I/C Signature: Date: Aug 4, 2006

Pilot's Name: Martin Massicotte Pilot's License No: CH384467

If applicable - DAR's Signature DAR's Name/No: DAR #310

Mirko Zgela Aug 4, 2006

AAC-STR-BP-R44-1000

Aviatech Airworthiness Consultants
4100 Renoir
Trois-Rivières, (QC)
G8Y 6Y6

Aviatech Airworthiness Consultants

Structural Substantiation
Helitowcart Inc. BearPaw Model BP44

Report: STR-BP44-R44-1000 (Rev NC)

APPROVED BY: M Zgela DATE: JULY 4, 2006

Mirko Zgela
Design Approval Representative DAR #310

Revision	Revision Date	Revision of Entry	Entered by

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Figure (2) – U-Shape Clip - Local Moment due to Drag Load

1.0 INTRODUCTION

1.1 Purpose

This document provides the structural substantiation for the installation of the Helitowcart Inc. BearPaw Model BP44 on the Robinson R44 helicopters. More specifically this report will demonstrate compliance to the following AWM 527 airworthiness requirements:

AWM 527	Requirements
27.301	Loads
27.305	Strength & Deformation
27.307	Proof of structure
27.337	Maneuvering conditions
27.501	Ground Load Conditions – Landing Gear with Skids
27.603	Material Strength Properties
27.605	Fabrication Methods
27.607	Fasteners
27.609	Protection of structure
27.611	Inspection provisions
27.619	Special Factor
27.621	Casting Factor
27.623	Bearing Factor
27.625	Fitting Factor

1.2 Background

Helitowcart Inc is a company that design, manufacture and distribute ground handling devices for light to medium weight helicopters. Its mission is to design and provide reliable and secure products, capable of multiple applications and incorporating superior aesthetics. In order to increase its product line basis, Helitowcart Inc has developed a BearPaw design for the Robinson R44 helicopter. This design requires airworthiness approval in the form of an STC.

2.0 PROPOSED MODIFICATION

2.1 Modification Description

The Helitowcart BearPaw is made of machined UHMW TIVAR® polymer 0,025 in. sheet material. This material combines high-impact performance, low friction and good resistance to chemical. Its high durability provides superior performance. The UHMW Polymer has a lower coefficient of friction than glass. Together with its self lubricating characteristics is an ideal material for this design application where sliding contact is encountered.

The machined BearPaw is attached to the R/H and L/H helicopter aft skid tubes where the aft cross tube attaches. The BearPaw is attached to the skids using two stainless steel bands and fours AN-4 bolts. The BearPad pad has a machine recess that perfectly matches the cross tube contour providing a smooth skid load bearing. The total weight of the installation is less than 6 lbs. A typical BearPaw Model BP44 installation on a Robinson R44 helicopter is shown in Figure (1).

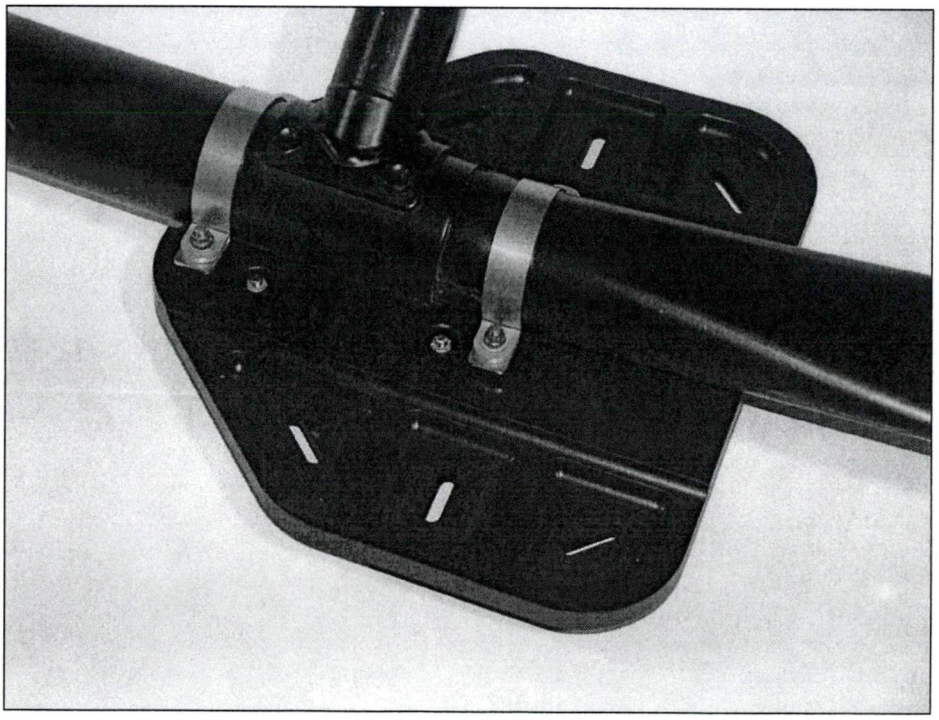


Figure (1) – Installation of BearPaw Model PB44 on R44 Helicopter

2.2 Applicable Drawings & Configuration

The following drawings define the structural configuration of the BearPaw Model BP44 and have been used in the analysis.

Drawings #	Title	Revision Status	Date
VNR083	BearPaw Assembly	R03	Apr 24, 2006
VNR084	BearPaw – Iceblade	R01	Apr 24, 2006
VNR085	BearPaw – Iceblade Threaded Rod	R01	Apr 24, 2006
VNR086	BearPaw – Iceblade Assembly	R01	Apr 24, 2006
VNR088	BearPaw - Pad	R03	Apr 24, 2006
VNR087	BearPaw – U Shaped Clip	R04	July 4, 2006
VNR089	Bearpaw – Slotted Clip Support	R03	Apr 24, 2006

2.3 Material Properties

All material properties used in the analysis have been extracted from the MIL-HDBK-5F or material specification relevant to the materials used. Annex A provides the UHMW TIVAR© material properties.

3.0 STRUCTURAL LOADS

3.1 Structural Loading Action

The helicopter BearPaw will be subjected to both maneuvering and ground loading actions. Since the BearPaw has a very small cross-section and is of light weight the only significant loads will be generated by the ground loading actions. As such, only the ground loads will be considered in the analysis.

3.2 Ground Loads

Since the BearPAw is attached to the skid tube, it would be appropriate to use the AWM 527.501 (f) (2) Ground Loads condition to derive the design loads for the BearPaw. These would however not be realistic since they are mainly used to size the diameter of the skid

tube. Since the BearPaw only covers a very limited section of the skids it can be confidently stated that the BearPaw installation would only take a portion of the landing gear load generated during the landing. In fact only a small portion of the landing loads would be taken by the BearPaw in all possible landing conditions. The BearPaw would also be subjected to drag loads resulting from running landing.

In order to derive the design loads for the BearPaw it is assumed that the one BearPaw will take the entire weight of the helicopter. This is a very conservative assumption for all possible landing conditions. It will be also assumed that the load will distributed evenly underneath the BearPaw foot print. The drag force F_d resulting from this load by be approximated by:

$$F_d = \mu F_w \quad (1)$$
$$F_d = 0{,}17 \times 2400 = 408 \text{ lbs}$$

Where:

M = Bearpaw static friction coefficient 0.17 (from Annex A);
F_w = BearPaw foot print load. (Helicopter gross weight 2400 lbs (from TCDS)

3.3 Factors

Based on the AWM requirements, the following factor will be used in the detailed stress analysis if required:

a) a factor of 1.5 to go from limit to ultimate load
b) a factor of 1.15 to be used as fitting factor since the equipment will be subjected to significant vibrations.

4.0 DETAILED STRESSING

4.1 Failure Modes

The following failures modes will be evaluated;

- Failure of BearPaw pad resulting from the combine loading F_d and F_w;
- Failure of stainless steel clip due to the application of F_d;
- Failure in shear and bearing of the stainless steel clip attaching bolts.

4.2 BearPaw Pad Failure (Drw# VNR088)

In order to evaluate the Bear Paw pad a Finite Element Analysis was conducted using the ANSYS 10.0 Finite Analysis Code. The following loading conditions were evaluated;

- Application of combined loading F_d and F_w constraint BearPaw lips (Scenario #1)
- Application of helicopter load $F_{w;}$ (Scenario #2);
- Application of combined loading F_d and F_w; constraint at attachment bolts (Scenario #3)

The design load F_w was scaled up to 2640 lbs to account for helicopter gross weight increase and the drag F_d was scale up to 30 % of F_w to account for variability in static friction coefficient for different soils conditions.

The F_w load was distributed as a uniform pressure underneath the BearPaw and the F_d was distributed as a uniformly distributed load along the leading edge of the BearPaw.

The boundary conditions selected restrained the BearPaw model in all three translation axes, but allowed some rotation to occur along its longitudinal axis of symmetry sine the stainless steel clips attaching the BearPaw to the skid tube can allow some rotations.
The result of the analysis is provided as Annex A. Neglecting the pin point high stress concentrations the most critical condition for the global stress distribution was scenario #1.

As shown in figure A1.5 (Annex A) the maximum stress in the BearPaw pad is located on its underside centerline. The stress ranges from 2.2 to 2.6 KSI in tension.

As such we have:

$$MS = Ftu/(1.5 \times Fap) \qquad (2)$$

Where;

Ftu = 6800 psi (From Annex A)
Fap = Applied stresses resulting from design loads = 2.6 KSI

MS = 1.7

4.3 Failure of Stainless Steel U Shape Clip (Drg# VNR087)

The most probable failure of the U shape stales steel clip would be from the local moment M_{RD} resulting from the drag load application. The loading action is as shown in Figure (2).

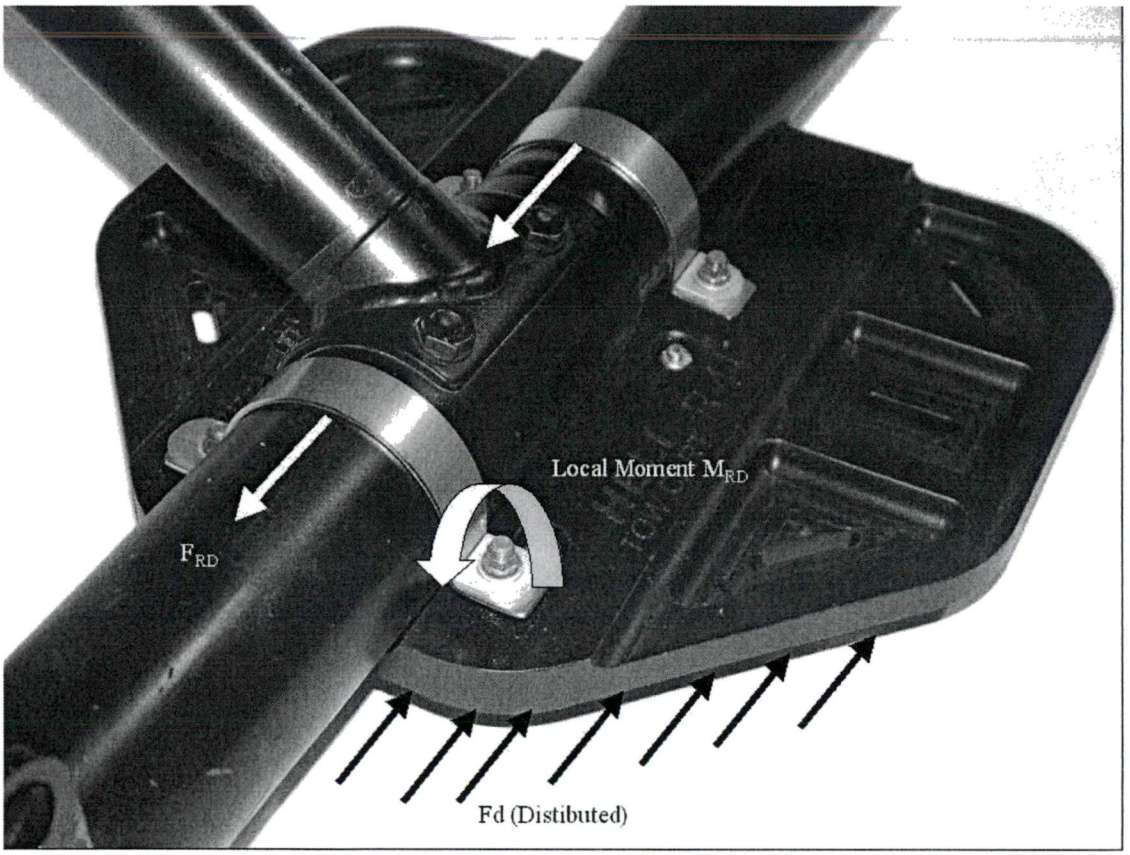


Figure (2) – U-Shape Clip Local Moment due to Drag Load

Assuming that the local moment will be distributed equally between the four attachments, the local moment will be given by;

$$M_{RD} = (Fd \times lm)/4 \qquad (3)$$

Where;

Fd = Total drag load = 17% of Fw = 408 lbs

lm = Distance between the mid section of the skid tube to the bottom of clip = 1.00 in. Since the reaction is taken by friction along the circumference of the U shape clip.

M_{RD} = (408 x 1.0)/4 = 102 in-lbs

This local moment will be reacted by shear stresses resulting form the applied torsion in the clip cross section. The shear stresses F_{SRD} will be given by:

$$F_{SRD} = (3 \times M_{RD})/(b \times t^2) \quad (4)$$

Where;

M_{RD} = Local moment = 102 in-lbs (Ultimate)
b = Clip cross sectional length = 0.75 in.
t = Clip thickness = 0.100 in.

$$F_{SRD} = (3 \times 102)/(0.80 \times 0.10^2)$$
$$= 38 \text{ KSI}$$

and;

$$MS = Fsu/(F_{SRD}) \quad (5)$$

Where;

Fsu = 40 KSI (From Bhrun page B2.9)

MS = 40/38 = 1.05

It is to be noted that this is a very conservative approach since some of the drag load is reacted by the BearPaw lip underneath the skid.

4.4 Shear and Bearing Failure – U Shape Attaching Bolts

Shear:

The drag load Fd, will be equally distributed amongst the four AN4-14A bolts. Each of these bolts can take up to 3600 lbs in single shear. These are therefore passed by inspection.

Bearing:

The allowable bearing load B_{RD} for the UHMW TIVAR material will be given by:

$$B_{RD} = F_{Bru} \times D \times T \quad (6)$$

Where;

F_{Bru} = Bearing strength conservatively assumed to be equal to the shear strength = 3500 psi (From Annex A)

D = AN4 Bolt Diameters = 0.25 in.

t = Plate thickness at bolt hole = 0.67 in.

B_{RD} = 3500 x 0.25 x 0.67 = 586 lbs

The bearing load will be distributed equally between the four AN4 bolts. So each bolt will have a bearing load Fb of 408/4 = 102 lbs.

and;

$$MS = B_{RD} / Fb \quad (5)$$

Where;

MS = 586/102 = 5.7

5.0 CONCLUSIONS

Based on the above analysis the BearPaw Assembly installation is deemed structurally acceptable.

6.0 REFERENCES

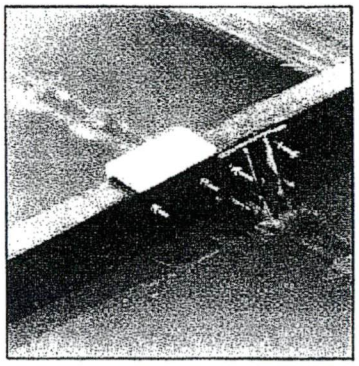
[1] Bruhn, "Analysis and Design of Flight Vehicle Structures", Second Edition, June 1973.

[2] Shigley, Joseph E., "Mechanical Engineering Design", Second Edition, 1963.

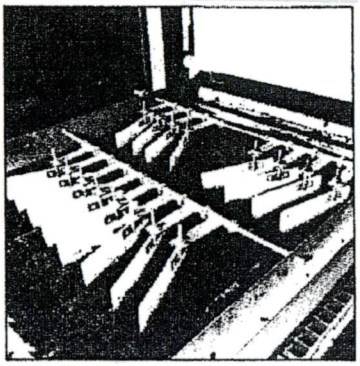
Appendix A

Material Properties

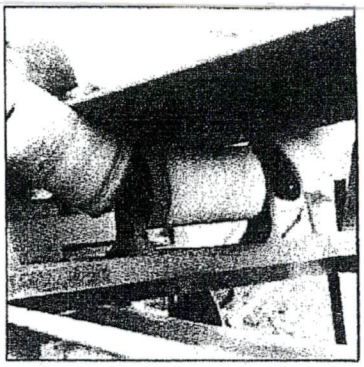
Propriétés du UHMW TIVAR®



TIVAR flight wear shoes do not corrode, and outwear shoes made from metals, urethanes and other plastics.



TIVAR is used in many OEM applications to solve abrasion and corrosion problems. The scrapers on this belt press are of TIVAR.



Conveyor rollers lined with TIVAR reduce belt wear. Wet sludge doesn't build up as on conventional rollers.

PHYSICAL PROPERTIES

PROPERTY		TEST METHOD	UNIT	TYPICAL VALUE
Specific Gravity		ASTM D-792	g/cm³	0.94
Yield Strength	@73°F	ASTM D-638	p.s.i.	3400
Ultimate Tensile Strength	@73°F	ASTM D-638	p.s.i.	6800
Break Elongation	@73°F	ASTM D-638	%	450
Yield Strength	@250°F	Stress Strain Diagram	p.s.i.	700
Ultimate Tensile Strength	@250°F	Stress Strain Diagram	p.s.i.	3300
Break Elongation	@250°F	Stress Strain Diagram	%	900
Hardness —Rockwell "R" Scale		ASTM D-785	—	64
Shore "D" Scale		ASTM D-2240	—	67
Flexural Modulus of elasticity		Bend Creep/1 min. value	p.s.i.	110,000
Shear Strength		ASTM D-732	p.s.i.	3500
Izod Impact +	@23°c	ASTM D-256A	ft-lbs/in. notch	No Break
−	@140°c	ASTM D-256A	ft-lbs/in. notch	No Break
Environmental Stress Cracking @ F_{50}		ASTM D-1693 Mod	hrs.	6000
Water Absorption		ASTM D-570	—	NIL

COEFFICIENT OF FRICTION

UHMW Polymer has a lower coefficient of friction than glass. Together with its self-lubricating characteristics it is an ideal material for bearings, bushings, valves, wear strips or any application where sliding contact is encountered.

MATERIALS	STATIC	KINETIC	TEST METHOD
Mild Steel vs. Mild Steel	0.30-0.40	0.25-0.35	ASTM D-1894
Mild Steel vs. TIVAR-100	0.15-0.20	0.12-0.20	
TIVAR-100 vs. TIVAR-100	0.20-0.30	0.20-0.30	

DEFORMATION UNDER COMPRESSION - %							PERMANENT DEFORMATION AFTER REMOVAL OF LOAD	
TEMP°F	PSI COMPRESSION	INITIAL LOADING 10 MIN.	100 MIN.	1000 MIN.	1 DAY	56 DAYS	AFTER 1 MIN.	AFTER 24 HRS.
68°	282	1.5	1.7	1.8	1.9	2.4	0.9	0.6
	570	2.4	2.5	2.7	3.0	4.0	1.8	1.2
	850	3.0	4.0	4.5	5.0	5.1	2.7	1.8
	1140	4.0	5.0	6.0	7.0	7.5	3.6	2.4
	1420	5.0	6.5	7.5	8.0	9.0	4.5	2.9
	1700	7.0	7.5	8.0	10.0	11.0	5.4	3.5

CHEMICAL RESISTANCE

Hydrochloric acid (conc.) - no appreciable reaction up to 80°C

Nitric acid (20%) - less than 20% decrease in yield stress and ultimate tensile strength up to 80°C.

Sulphuric acid (50%) - no appreciable reaction up to 80°C. Less than 20% decrease in properties at 75% concentration.

Sodium hydroxide (caustic soda) - no appreciable reaction up to 80°C.

Sodium hypochlorate and most aqueous solutions of inorganic salts - no appreciable reaction up to 80°C.

Hydrocarbons and halogenated hydrocarbons -limited resistance. Each application should be evaluated.

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QUÉBEC : 1275, de la Jonquière, Québec, QC, Tél. : 418-682-0760 ou 1-866-682-0760
MONTRÉAL : 7600, Rte Transcanadienne, St-Laurent, QC, H4T 1A5 Tél. : 514-738-6817 ou 1-888-506-9600

Appendix B

FEA Static Analysis

BearPAw Pad

ANSYS®
Report

Projet

Auteur

Francois Brousseau Ing. Jr

Sujet

Bear Foot R-44

Préparé pour

M. Zgela

Projet créé le

lundi 17 avril 2006 at 20:52:02

Dernière modification le

mardi 4 juillet 2006 at 19:48:59

Rapport créé le

mardi 4 juillet 2006 at 19:48:59

Logiciel utilisé

ANSYS 10.0

Base de données

C:\Documents and Settings\francoisb.\Bureau\Mirko's Job\Bear Foot R44\Bear Foot 3.dsdb*

---

1. Résumé

Ce rapport documente les informations de conception et d'analyse créées et mises à jour par le logiciel d'ingénierie ANSYS® . Chaque scénario présenté ci-dessous représente une simulation numérique complète.

Scénario 1

- Sur la base de DesignModeler pièce *"C:\Documents and Settings\francoisb.*\Bureau\Mirko's Job\Bear Foot R44\Bear Foot 2.agdb"*.
- Etant donné les effets charges structurales et supports structuraux.
- Calcul structuraux résultats.
- Pas de critères de convergence définis.
- Pas de critères d'alerte définis.
- Voir Scénario 1 ci-dessous pour plus de détails et l'Annexe A1 pour visualiser les figures correspondantes.

Scénario 2

- Sur la base de DesignModeler pièce *"C:\Documents and Settings\francoisb.*\Bureau\Mirko's Job\Bear Foot R44\Bear Foot 2.agdb"*.
- Etant donné les effets charges structurales et supports structuraux.
- Calcul structuraux résultats.
- Pas de critères de convergence définis.
- Pas de critères d'alerte définis.
- Voir Scénario 2 ci-dessous pour plus de détails et l'Annexe A2 pour visualiser les figures correspondantes.

Scénario 3

- Sur la base de DesignModeler pièce *"C:\Documents and Settings\francoisb.*\Bureau\Mirko's Job\Bear Foot R44\Bear Foot 2.agdb"*.
- Etant donné les effets charges structurales et supports structuraux.
- Calcul structuraux résultats.
- Pas de critères de convergence définis.
- Pas de critères d'alerte définis.
- Voir Scénario 3 ci-dessous pour plus de détails et l'Annexe A3 pour visualiser les figures correspondantes.

---

2. Introduction

Le logiciel d'IAO (Ingénierie assistée par ordinateur) ANSYS a été utilisé conjointement avec des géométries CAO solides en 3D pour simuler le comportement de corps mécaniques sous différentes conditions thermiques/structurales. ANSYS a automatisé les techniques d'analyse par éléments finis (FEA) d'ANSYS, Inc. pour générer les résultats présentés dans ce rapport.

Chaque scénario présenté ci-dessous représente une simulation numérique complète. La définition d'une simulation comprend les facteurs connus d'une conception, à savoir les propriétés de matériau des corps, le contact entre ces derniers (dans un assemblage), ainsi que le type et l'intensité des conditions de chargement. Les résultats obtenus par simulation donnent une idée de la performance des corps et des améliorations à apporter à la conception. Plusieurs scénarios permettent la comparaison des résultats en fonction de conditions de chargement, de configurations géométriques ou de matériaux différents.

Des critères de convergence et d'alerte peuvent être définis pour tous les résultats et servir de guides dans l'évaluation de la qualité des résultats calculés et de l'acceptabilité des valeurs dans le contexte des conditions de conception définies.

- L'*Historique de la solution* offre un moyen d'évaluer la qualité des résultats en examinant comment les valeurs changent durant les itérations successives de raffinement de la solution. Les *Critères de convergence* définissent une limite spécifique sur l'évolution des résultats permise entre les itérations. Un résultat satisfaisant ces critères est dit "convergé".
- Les *Critères d'alerte* définissent les plages " acceptables " des valeurs des résultats. Ces plages représentent généralement des aspects connus de la spécification de la conception.

Toutes les valeurs sont présentées dans le système d'unités *"Système américain (po, lbm, lbf, °F, s, V, A)"*.

Avis

L'acceptation ou le rejet d'une conception ne doit pas se faire uniquement sur la base des données présentées dans ce rapport. Les conceptions doivent être évaluées en tenant compte également des résultats des essais et de l'expérience pratique des ingénieurs et des analystes. Toute approche conceptuelle axée sur la qualité doit se fonder sur les essais physiques pour valider de manière définitive l'intégrité structurale à un niveau de précision mesuré.

3. Scénario 1

3.1. "Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"

"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar" obtient la géométrie à partir de DesignModeler la pièce *"C:\Documents and Settings\francoisb.*\Bureau\Mirko's Job\Bear Foot R44\Bear Foot 2.agdb"*.

- cadre de contour le modèle mesure 12,75 par 11,25 par 1,0 in le long des axes globaux x, y et z respectivement.
- Le modèle a une masse totale de 2,87 lbm.
- Le modèle a un volume total de 84,41 in³.

Tableau 3.1.1. Corps

Nom	Matériau	Effets des matériaux non linéaires	Bounding Box(in)	Masse (lbm)	Volume (in³)	Noeuds	Eléments
"VNR088 2.ipt"	*"UHMW"*	Non	12,75, 11,25, 1,0	2,87	84,41	21677	12809

3.1.1. Maillage

- *"Maillage"*(Figure A1.1) , associé à *"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"* présente une pertinence globale de 50.
- *"Maillage"* contient 21677 des noeuds et des 12809 éléments.

3.2. "Environnement"

L'option Type de simulation est réglée sur Statique

L'option Type d'analyse est réglée sur Structurale statique

"Environnement"(Figure A1.2) contient toutes les conditions de chargement définies pour *"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"* dans ce scénario.

3.2.1. Chargement structural

Tableau 3.2.1.1. Charges structurales

Nom	Type	Intensité	Vecteur	Force de réaction	Vecteur de la force de réaction	Moment de réaction	Vecteur du moment de réaction
"Force"	Force appliquée à une surface	2 640,0 lbf	[0,0 lbf x, 0,0 lbf y,2 640,0 lbf z]	N/D	N/D	N/D	N/D

"Force 2"	Force appliquée à une surface	792,0 lbf	[0,0 lbf x, -792,0 lbf y,0,0 lbf z]	N/D	N/D	N/D	N/D
"Déplacement 2"	Déplacement imposé à une surface	0,0 in	[- x, 0,0 in y,- z]	969,62 lbf	[0,0 lbf x, 969,62 lbf y, 0,0 lbf z]	103,67 lbf·in	[99,02 lbf·in x, 0,0 lbf·in y, -30,69 lbf·in z]

3.2.2. Supports structuraux

Tableau 3.2.2.1. Structural Supports

Nom	Type	Radiale	Axiale	Tangentielle	Force de réaction	Vecteur de la force de réaction	Moment de réaction	Vecteur du moment de réaction
"Support sans frottement"	Support sans frottement (Désactivé)	N/D	N/D	N/D	0,0 lbf	[0,0 lbf x, 0,0 lbf y, 0,0 lbf z]	0,0 lbf·in	[0,0 lbf·in x, 0,0 lbf·in y, 0,0 lbf·in z]
"Support en compression"	Compression seule	Libre	Libre	Libre	2 642,2 lbf	[19,46 lbf x, -177,64 lbf y, -2 636,15 lbf z]	0,0 lbf·in	[0,0 lbf·in x, 0,0 lbf·in y, 0,0 lbf·in z]

REMARQUE: Si le corps contient deux ou plusieurs supports partageant une arête ou un sommet, évaluez minutieusement les forces de réaction au niveau de ces supports. Le calcul des forces de réaction inclut les forces appliquées le long des arêtes de délimitation et des sommets. Lorsque des supports présentent des arêtes ou des sommets communs, la somme totale des forces peut ne pas être en équilibre.

Tableau 3.2.2.2. Ressorts de faible raideur

Etape	Amplitude de la force de réaction	Vecteur de la force de réaction
Etape 1	$5{,}14\times10^{-5}$ lbf	[$-1{,}28\times10^{-7}$ lbf x, $1{,}88\times10^{-6}$ lbf y, $-5{,}13\times10^{-5}$ lbf z]

3.3. "Solution"

L'option Type de moteur de résolution est réglée sur Contrôlé par le programme

L'option Ressorts de faible raideur est réglée sur Contrôlé par le programme

L'option Grand déplacement est réglée sur Désactivé

"Solution" contient la réponse calculée pour *"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"* en fonction des conditions de chargement définies dans *"Environnement"*.

Un ou plusieurs corps sont peut-être sous-contraints et soumis à un déplacement de corps rigide. Des ressorts de faible raideur ont été ajoutés afin d'obtenir une solution.

- Le calcul de la dilatation thermique utilise une température de référence constante de 71,6 °F pour *"VNR088 2.ipt"*. Théoriquement, à une température uniforme de 71,6 °F no déformation n'est causée par la dilatation ou la contraction thermique.

3.3.1. Résultats structuraux

Tableau 3.3.1.1. Valeurs

Nom	Figure	Champ d'application	Orientation	Minimum	Maximum	Valeur minimale sur	Valeur maximale sur	Critères d'alerte
"Contrainte équivalente"	A1.3, A1.4, A1.5	*"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"*	Global	21,34 psi	4 000,49 psi	VNR0882.ipt	VNR0882.ipt	Aucun(e)
"Contrainte maximale de cisaillement"	Aucun(e)	*"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"*	Global	11,55 psi	2 028,49 psi	VNR0882.ipt	VNR0882.ipt	Aucun(e)
"Déformée totale"	A1.6, A1.7	*"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"*	Global	$9{,}13\times10^{-3}$ in	0,59 in	VNR0882.ipt	VNR0882.ipt	Aucun(e)
"Déformée directionnelle"	Aucun(e)	*"Vertical landing 2640 lbf with 30% drag load constrained at pvc Collar"*	Y Axe	$-2{,}54\times10^{-2}$ in	$8{,}52\times10^{-4}$ in	VNR0882.ipt	VNR0882.ipt	Aucun(e)

- Suivi de la convergence non activé.

4. Scénario 2

4.1. "Vertical Landing 2640 lbf"

"Vertical Landing 2640 lbf" obtient la géométrie à partir de DesignModeler la pièce *"C:\Documents and Settings\francoisb.*\Bureau\Mirko's Job\Bear Foot R44\Bear Foot 2.agdb"*.

- cadre de contour le modèle mesure 12,75 par 11,25 par 1,0 in le long des axes globaux x, y et z respectivement.
- Le modèle a une masse totale de 2,87 lbm.
- Le modèle a un volume total de 84,41 in³.

Tableau 4.1.1. Corps

Nom	Matériau	Effets des matériaux non linéaires	Bounding Box(in)	Masse (lbm)	Volume (in³)	Noeuds	Eléments
"VNR088 2.ipt"	*"UHMW"*	Non	12,75, 11,25, 1,0	2,87	84,41	21677	12809

4.1.1. Maillage

- *"Maillage"*(Figure A2.1) , associé à *"Vertical Landing 2640 lbf"* présente une pertinence globale de 50.
- *"Maillage"* contient 21677 des noeuds et des 12809 éléments.

4.2. "Environnement"

L'option Type de simulation est réglée sur Statique

L'option Type d'analyse est réglée sur Structurale statique

"Environnement"(Figure A2.2) contient toutes les conditions de chargement définies pour *"Vertical Landing 2640 lbf"* dans ce scénario.

4.2.1. Chargement structural

Tableau 4.2.1.1. Charges structurales

Nom	Type	Intensité	Vecteur	Force de réaction	Vecteur de la force de réaction	Moment de réaction	Vecteur du moment de réaction
"Force"	Force appliquée à une surface	2 640,0 lbf	[0,0 lbf x, 0,0 lbf y,2 640,0 lbf z]	N/D	N/D	N/D	N/D
"Déplacement"	Déplacement imposé à une surface	0,0 in	[- x, 0,0 in y,- z]	223,37 lbf	[4,7 lbf x, 221,59 lbf y, 27,79 lbf z]	95,41 lbf·in	[95,26 lbf·in x, 5,31 lbf·in y, 0,12 lbf·in z]

4.2.2. Supports structuraux

Tableau 4.2.2.1. Structural Supports

Nom	Type	Force de réaction	Vecteur de la force de réaction	Moment de réaction	Vecteur du moment de réaction
"Support sans frottement"	Support sans frottement	2 648,25 lbf	[5,71×10^{-6} lbf x, -208,81 lbf y, -2 640,0 lbf z]	5 899,95 lbf·in	[5 899,56 lbf·in x, 67,14 lbf·in y, -4,88 lbf·in z]

Tableau 4.2.2.2. Ressorts de faible raideur

Etape	Amplitude de la force de réaction	Vecteur de la force de réaction
Etape 1	3,52×10^{-5} lbf	[1,44×10^{-8} lbf x, -1,31×10^{-7} lbf y, -3,52×10^{-5} lbf z]

4.3. "Solution"

L'option Type de moteur de résolution est réglée sur Contrôlé par le programme

L'option Ressorts de faible raideur est réglée sur Contrôlé par le programme

L'option Grand déplacement est réglée sur Désactivé

"Solution" contient la réponse calculée pour *"Vertical Landing 2640 lbf"* en fonction des conditions de chargement définies dans *"Environnement"*.

Un ou plusieurs corps sont peut-être sous-contraints et soumis à un déplacement de corps rigide. Des ressorts de faible raideur ont été ajoutés afin d'obtenir une solution.

- Le calcul de la dilatation thermique utilise une température de référence constante de 71,6 °F pour *"VNR088 2.ipt"*. Théoriquement, à une température uniforme de 71,6 °F no déformation n'est causée par la dilatation ou la contraction thermique.

4.3.1. Résultats structuraux

Tableau 4.3.1.1. Valeurs

Nom	Figure	Champ d'application	Minimum	Maximum	Valeur minimale sur	Valeur maximale sur	Critères d'alerte
"Contrainte équivalente"	A2.3, A2.4, A2.5	*"Vertical Landing 2640 lbf"*	20,48 psi	4 055,73 psi	VNR088 2.ipt	VNR088 2.ipt	Aucun(e)
"Contrainte maximale de cisaillement"	Aucun(e)	*"Vertical Landing 2640 lbf"*	11,82 psi	2 072,83 psi	VNR088 2.ipt	VNR088 2.ipt	Aucun(e)
"Déformée	A2.6, A2.7	*"Vertical*	3,98×10^{-}	0,44 in	VNR088	VNR088	Aucun(e)

totale"		*Landing 2640 lbf"*	^{6} in		2.ipt	2.ipt	

- Suivi de la convergence non activé.

5. Scénario 3

5.1. "Vertical landing 2640 lbf with 30% drag load constrained at four bolts location"

"Vertical landing 2640 lbf with 30% drag load constrained at four bolts location" obtient la géométrie à partir de DesignModeler la pièce *"C:\Documents and Settings\francoisb.*\Bureau\Mirko's Job\Bear Foot R44\Bear Foot 2.agdb"*.

- cadre de contour le modèle mesure 12,75 par 11,25 par 1,0 in le long des axes globaux x, y et z respectivement.
- Le modèle a une masse totale de 2,87 lbm.
- Le modèle a un volume total de 84,41 in³.

Tableau 5.1.1. Corps

Nom	Matériau	Effets des matériaux non linéaires	Bounding Box(in)	Masse (lbm)	Volume (in³)	Noeuds	Eléments
"VNR088 2.ipt"	*"UHMW"*	Non	12,75, 11,25, 1,0	2,87	84,41	21677	12809

5.1.1. Maillage

- *"Maillage"*(Figure A3.1) , associé à *"Vertical landing 2640 lbf with 30% drag load constrained at four bolts location"* présente une pertinence globale de 50.
- *"Maillage"* contient 21677 des noeuds et des 12809 éléments.

5.2. "Environnement"

L'option Type de simulation est réglée sur Statique

L'option Type d'analyse est réglée sur Structurale statique

"Environnement"(Figure A3.2) contient toutes les conditions de chargement définies pour *"Vertical landing 2640 lbf with 30% drag load constrained at four bolts location"* dans ce scénario.

5.2.1. Chargement structural

Tableau 5.2.1.1. Charges structurales

Nom	Type	Intensité	Vecteur	Force de réaction	Vecteur de la force de réaction	Moment de réaction	Vecteur du moment de réaction
"Force"	Force appliquée à une surface	2 640,0 lbf	[0,0 lbf x, 0,0 lbf y,2 640,0 lbf z]	N/D	N/D	N/D	N/D

"Force 2"	Force appliquée à une surface	792,0 lbf	[0,0 lbf x, -792,0 lbf y,0,0 lbf z]	N/D	N/D	N/D	N/D
"Déplacement"	Déplacement imposé à une surface	0,0 in	[- x, 0,0 in y,- z]	959,63 lbf	[0,0 lbf x, 959,63 lbf y, 0,0 lbf z]	425,15 lbf·in	[424,47 lbf·in x, 0,0 lbf·in y, -24,12 lbf·in z]

5.2.2. Supports structuraux

Tableau 5.2.2.1. Structural Supports

Nom	Type	Radiale	Axiale	Tangentielle	Force de réaction	Vecteur de la force de réaction	Moment de réaction	Vecteur du moment de réaction
"Support en compression"	Compression seule	Libre	Libre	Libre	2 644,77 lbf	[-4,74 lbf x, -167,63 lbf y, -2 639,44 lbf z]	0,0 lbf·in	[0,0 lbf·in x, 0,0 lbf·in y, 0,0 lbf·in z]

Tableau 5.2.2.2. Ressorts de faible raideur

Etape	Amplitude de la force de réaction	Vecteur de la force de réaction
Etape 1	$5,07\times10^{-5}$ lbf	[$-1,26\times10^{-7}$ lbf x, $4,42\times10^{-7}$ lbf y, $-5,07\times10^{-5}$ lbf z]

5.3. "Solution"

L'option Type de moteur de résolution est réglée sur Contrôlé par le programme

L'option Ressorts de faible raideur est réglée sur Contrôlé par le programme

L'option Grand déplacement est réglée sur Désactivé

"Solution" contient la réponse calculée pour *"Vertical landing 2640 lbf with 30% drag load constrained at four bolts location"* en fonction des conditions de chargement définies dans *"Environnement"*.

Un ou plusieurs corps sont peut-être sous-contraints et soumis à un déplacement de corps rigide. Des ressorts de faible raideur ont été ajoutés afin d'obtenir une solution.

- Le calcul de la dilatation thermique utilise une température de référence constante de 71,6 °F pour *"VNR088 2.ipt"*. Théoriquement, à une température uniforme de 71,6 °F no déformation n'est causée par la dilatation ou la contraction thermique.

5.3.1. Résultats structuraux

Tableau 5.3.1.1. Valeurs

Nom	Figure	Champ d'application	Orientation	Minimum	Maximum	Valeur minimale sur	Valeur maximale sur	Critères d'alerte
"Contrainte	A3.3, A3.4, A3.5	*"Vertical*	Global	16,09 psi	3 639,76 psi	VNR088	VNR088	Aucun(e)

équivalente"		*landing 2640 lbf with 30% drag load constrained at four bolts location"*				2.ipt	2.ipt	
"Contrainte maximale de cisaillement"	Aucun(e)	*"Vertical landing 2640 lbf with 30% drag load constrained at four bolts location"*	Global	9,29 psi	1 893,9 psi	VNR088 2.ipt	VNR088 2.ipt	Aucun(e)
"Déformée totale"	A3.6, A3.7	*"Vertical landing 2640 lbf with 30% drag load constrained at four bolts location"*	Global	$1{,}72\times10^{-3}$ in	0,59 in	VNR088 2.ipt	VNR088 2.ipt	Aucun(e)
"Déformée directionnelle"	Aucun(e)	*"Vertical landing 2640 lbf with 30% drag load constrained at four bolts location"*	Y Axe	$-1{,}87\times10^{-2}$ in	$9{,}71\times10^{-3}$ in	VNR088 2.ipt	VNR088 2.ipt	Aucun(e)

- Suivi de la convergence non activé.

Annexes

A1. Scénario 1 Figures

Figure A1.1. *"Maillage"* Geometry

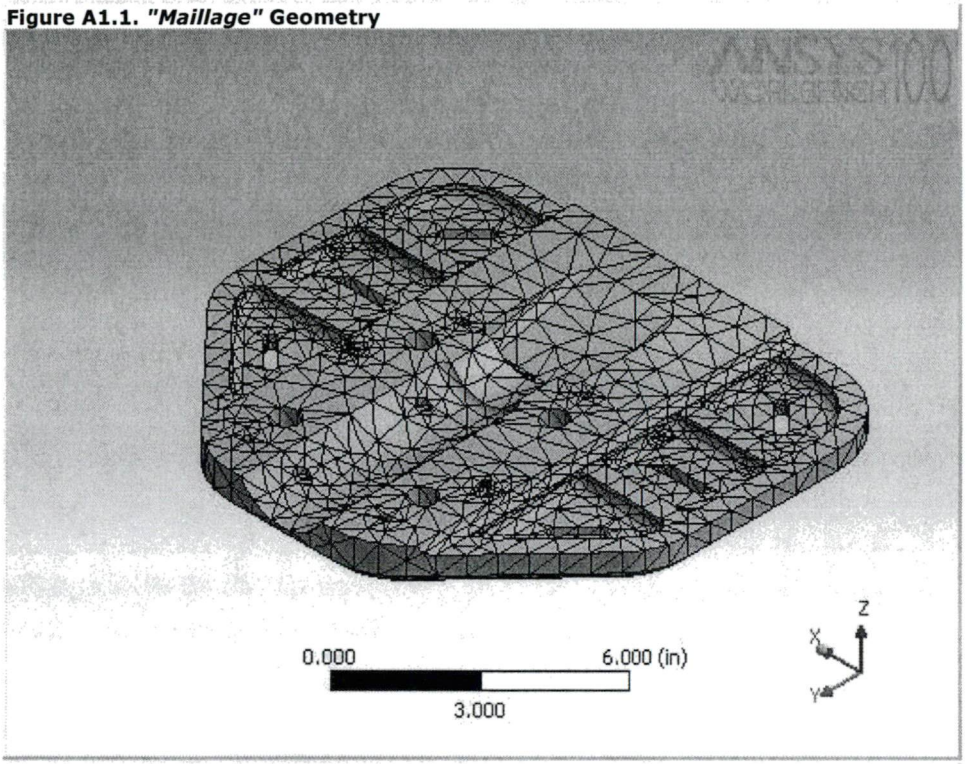


Figure A1.2. *"Environnement"* Geometry

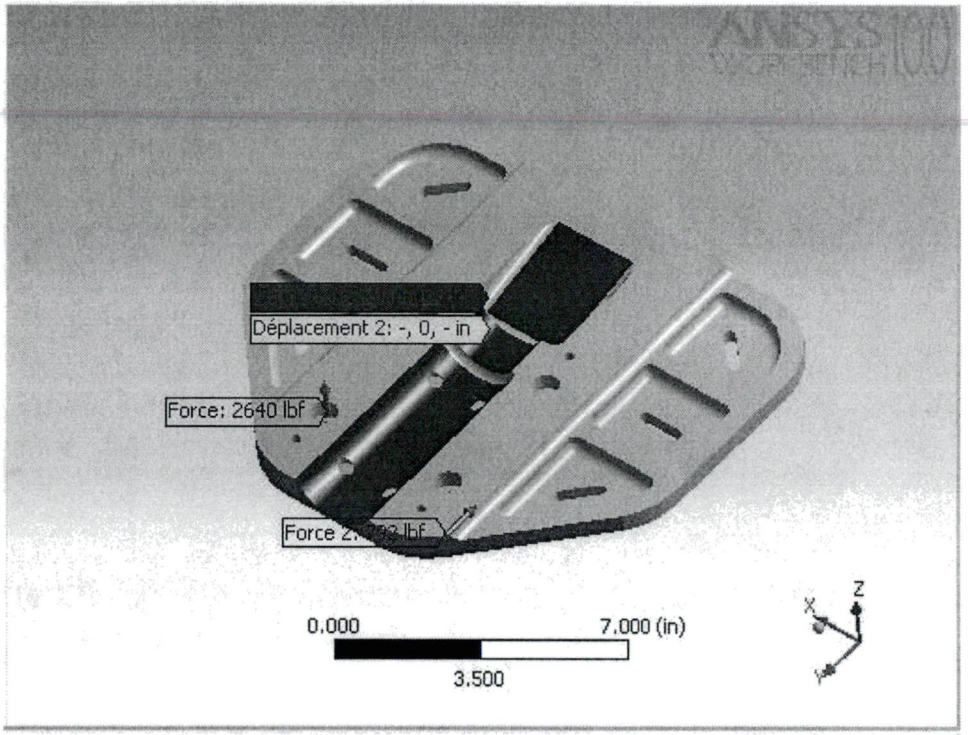


Figure A1.3. *"Contrainte équivalente"* Contours

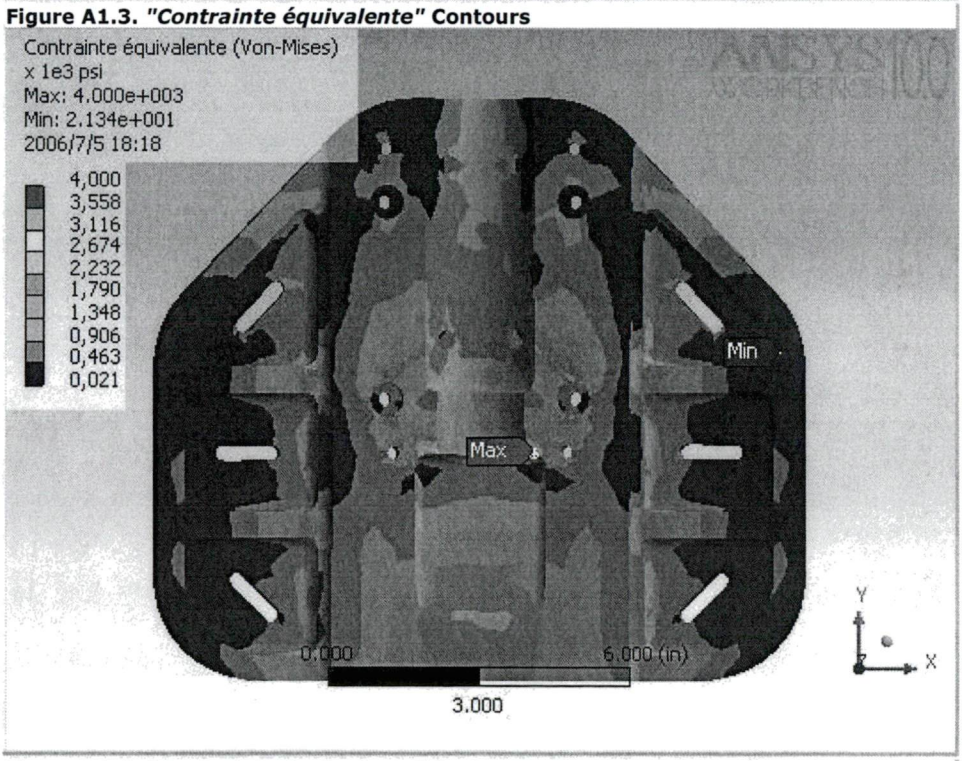


Figure A1.4. *"Contrainte équivalente"* Contours

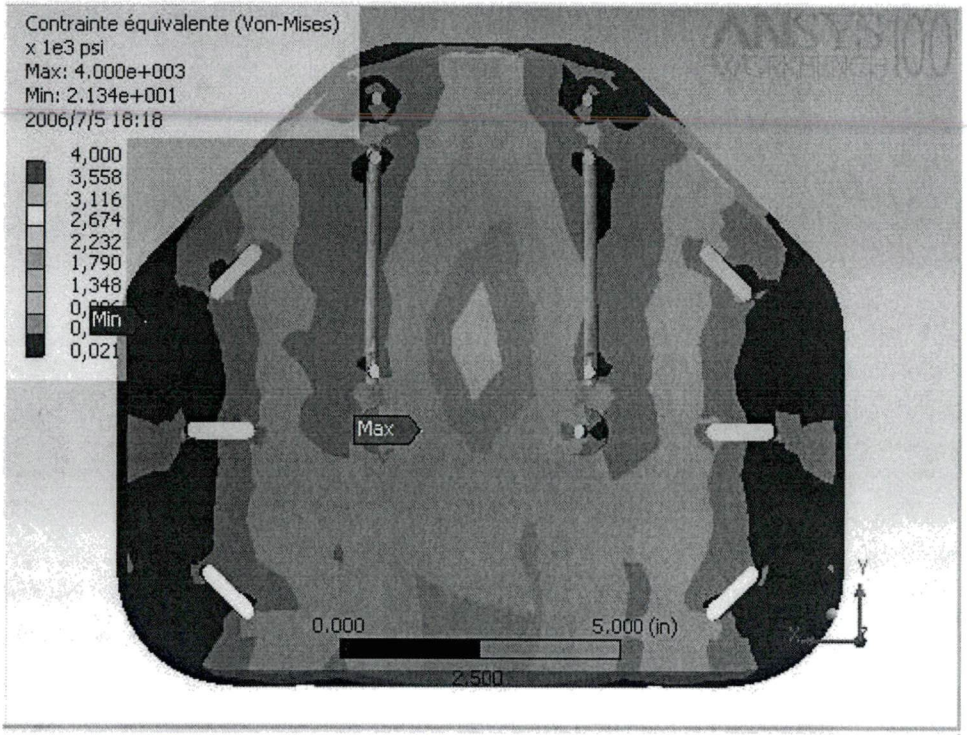


Figure A1.5. *"Contrainte équivalente"* Contours

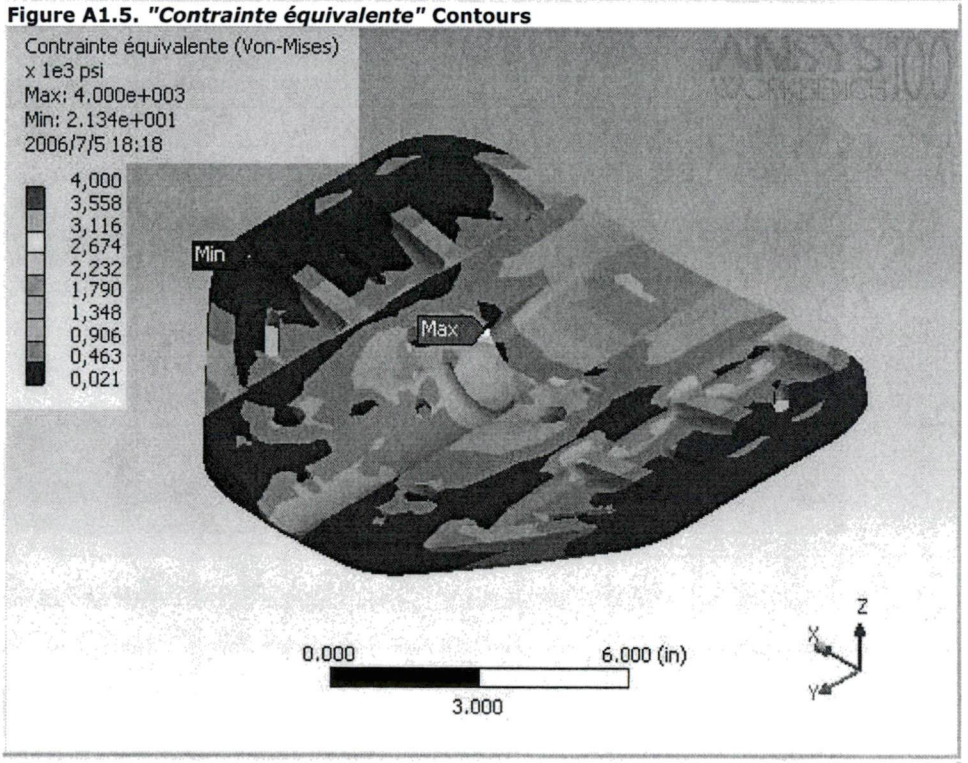


Figure A1.6. *"Déformée totale"* Contours

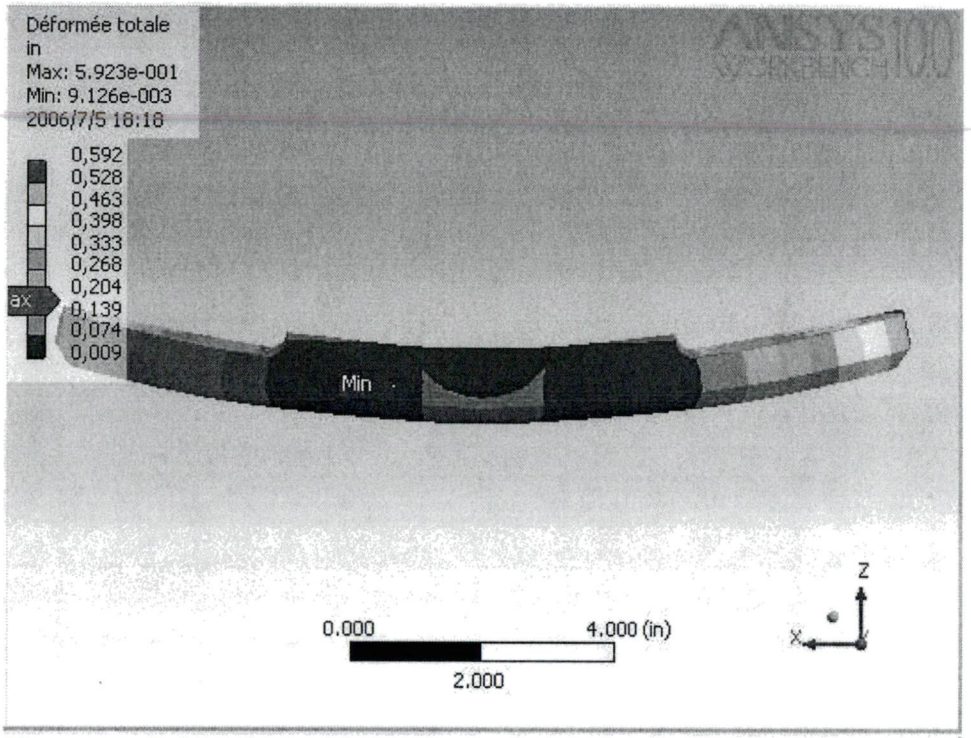
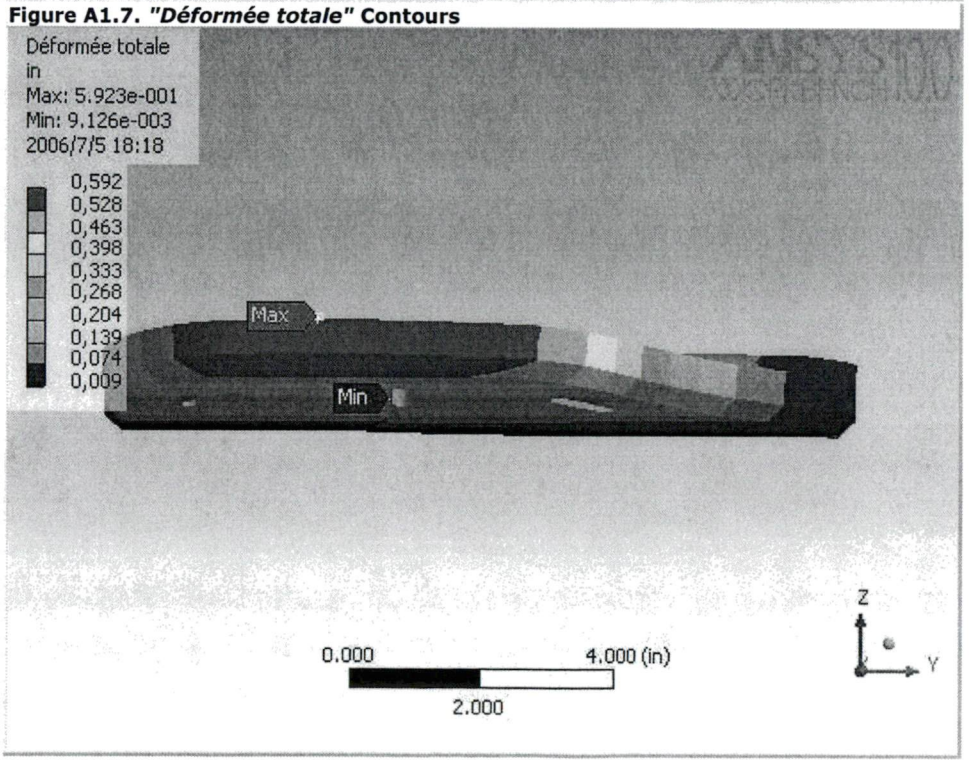


Figure A1.7. *"Déformée totale"* Contours



A2. Scénario 2 Figures

Figure A2.1. *"Maillage"* Geometry

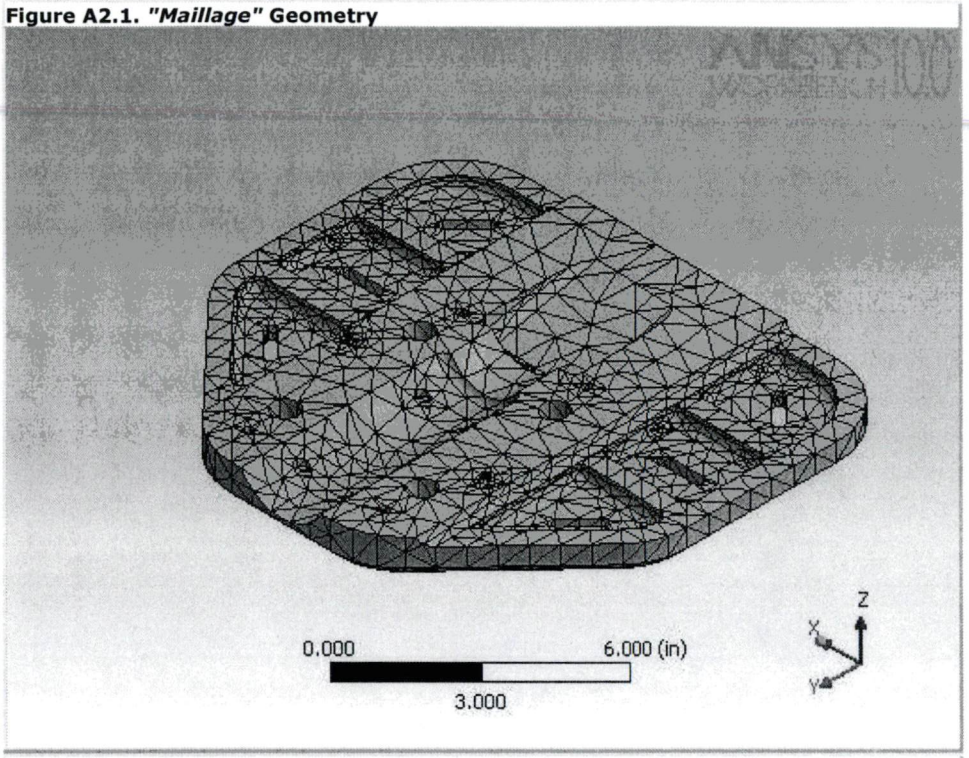


Figure A2.2. *"Environnement"* Geometry

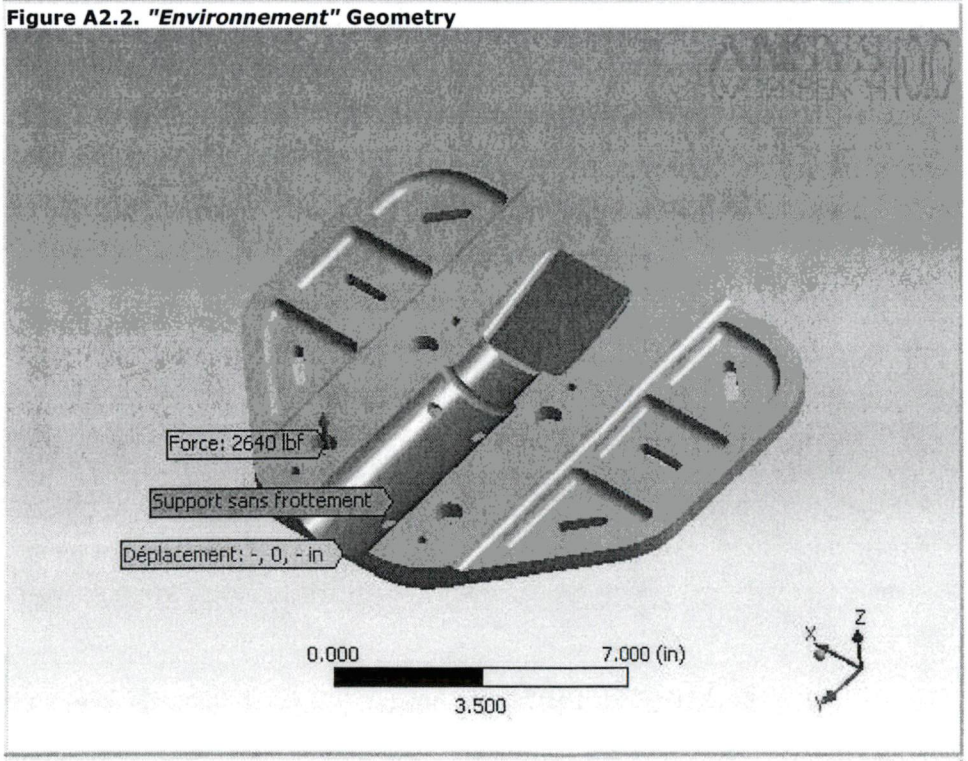


Figure A2.3. *"Contrainte équivalente"* Contours

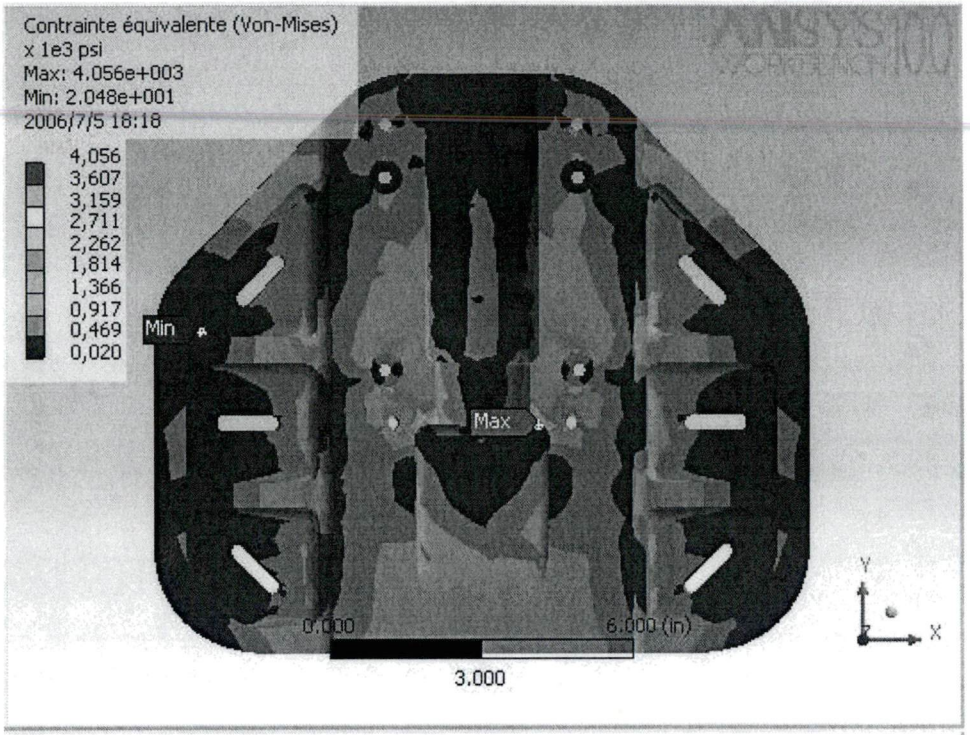


Figure A2.4. *"Contrainte équivalente"* Contours

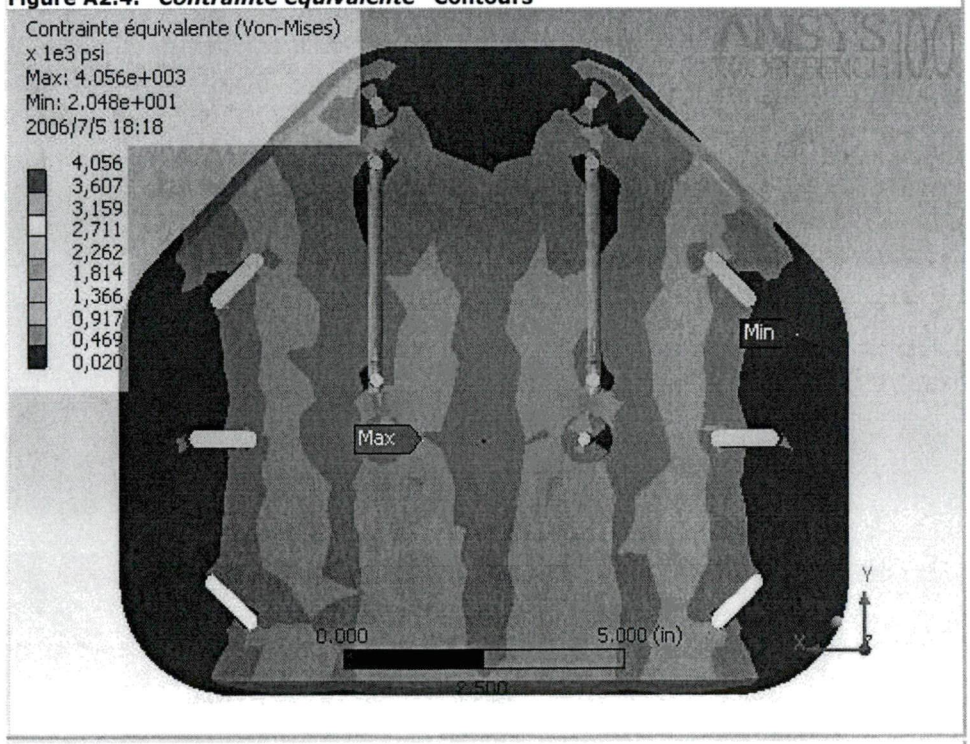


Figure A2.5. *"Contrainte équivalente"* Contours

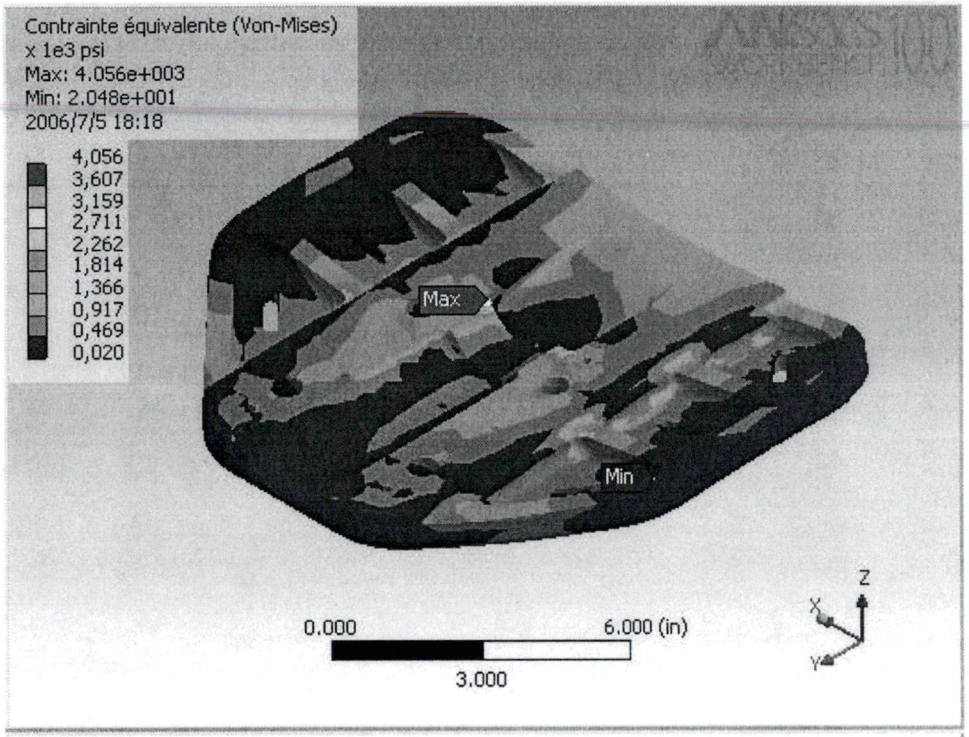


Figure A2.6. *"Déformée totale"* Contours

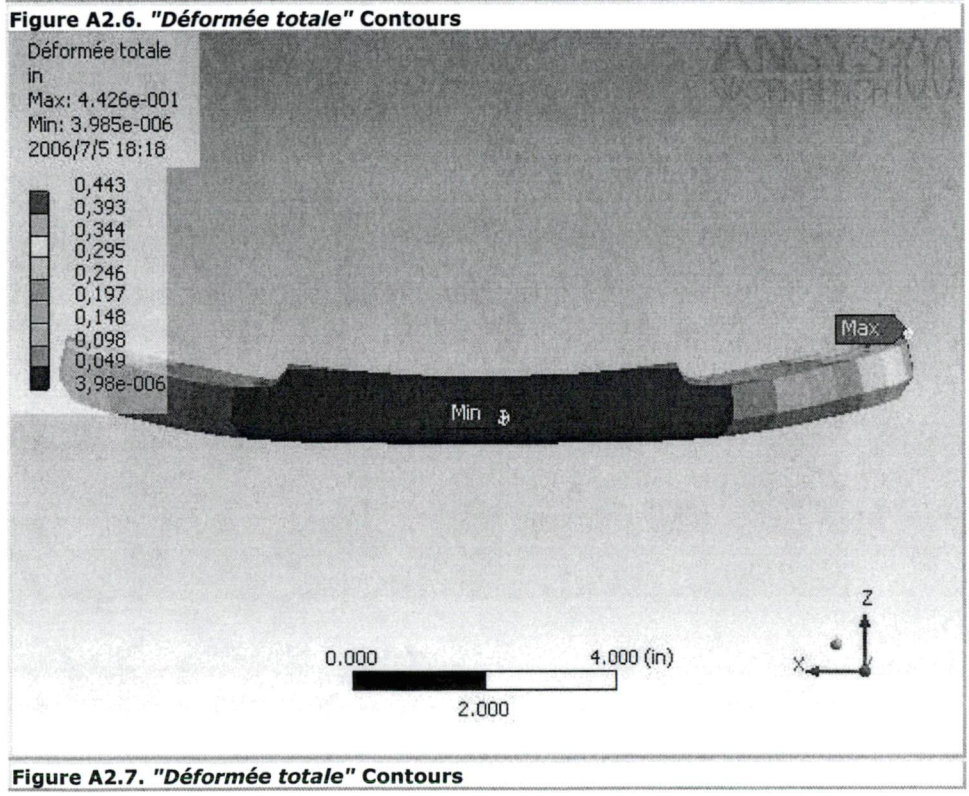
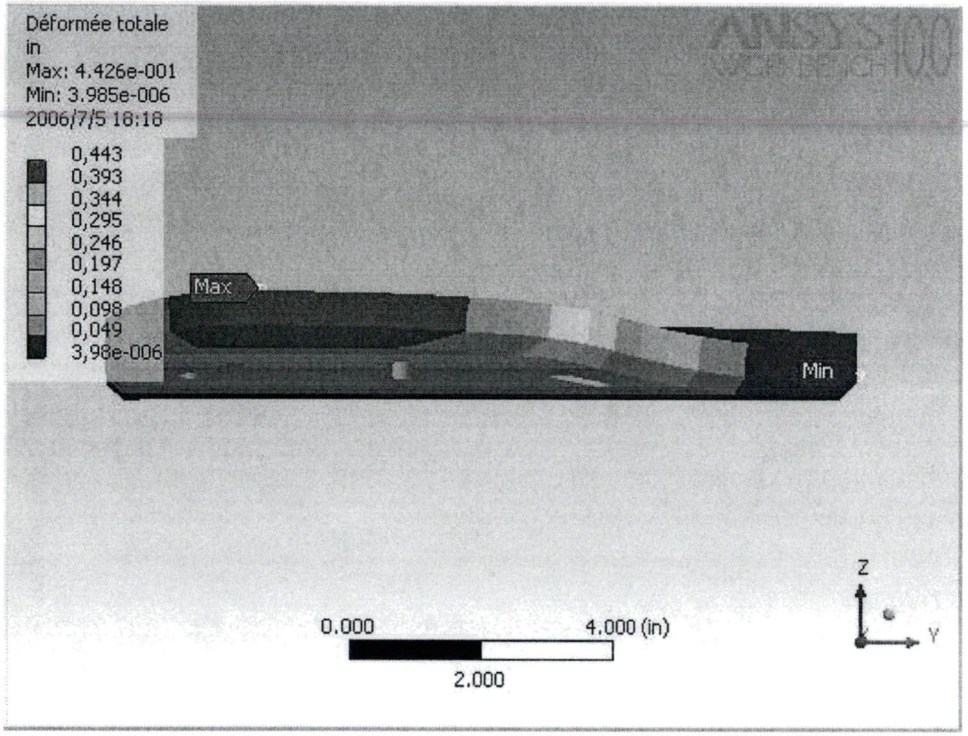


Figure A2.7. *"Déformée totale"* Contours



A3. Scénario 3 Figures

Figure A3.1. *"Maillage"* Geometry

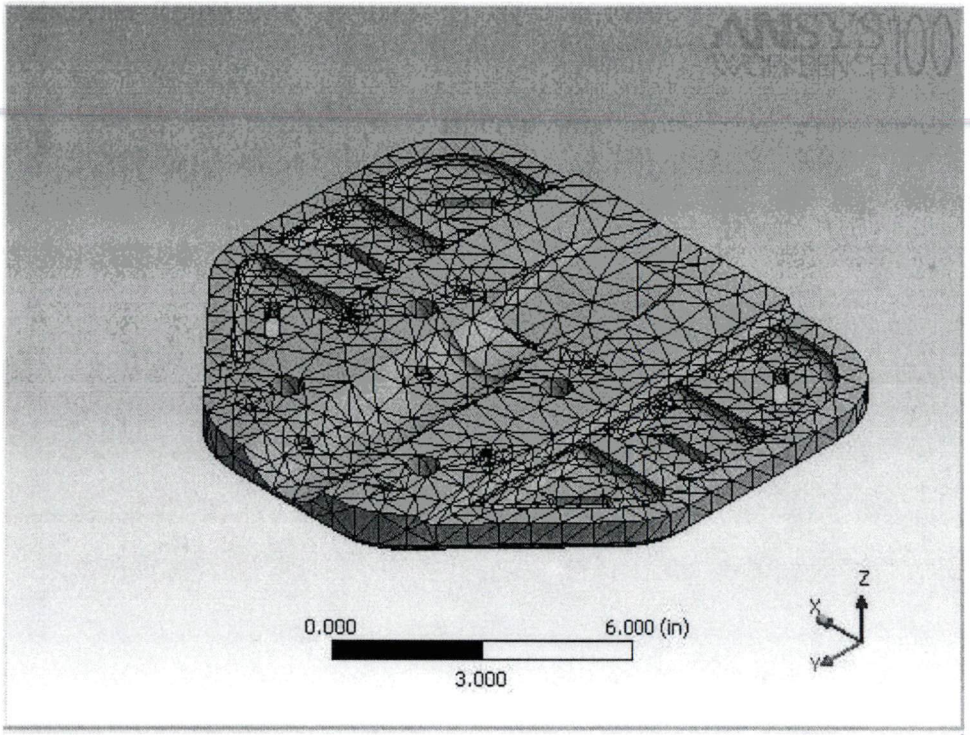


Figure A3.2. *"Environnement"* Geometry

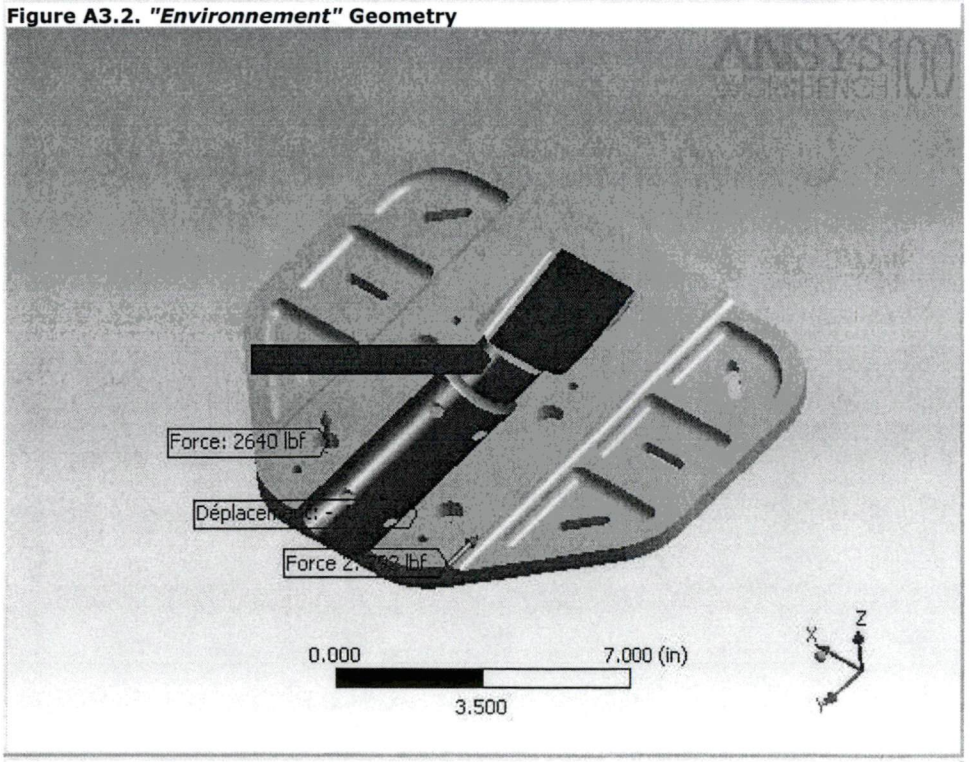


Figure A3.3. *"Contrainte équivalente"* Contours

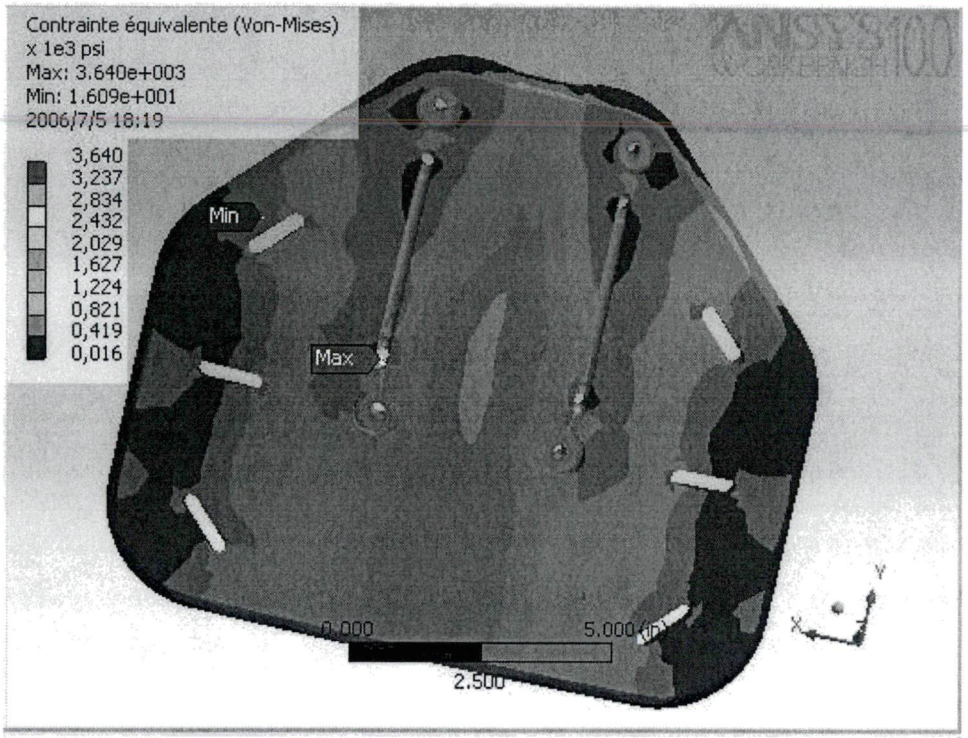


Figure A3.4. *"Contrainte équivalente"* Contours

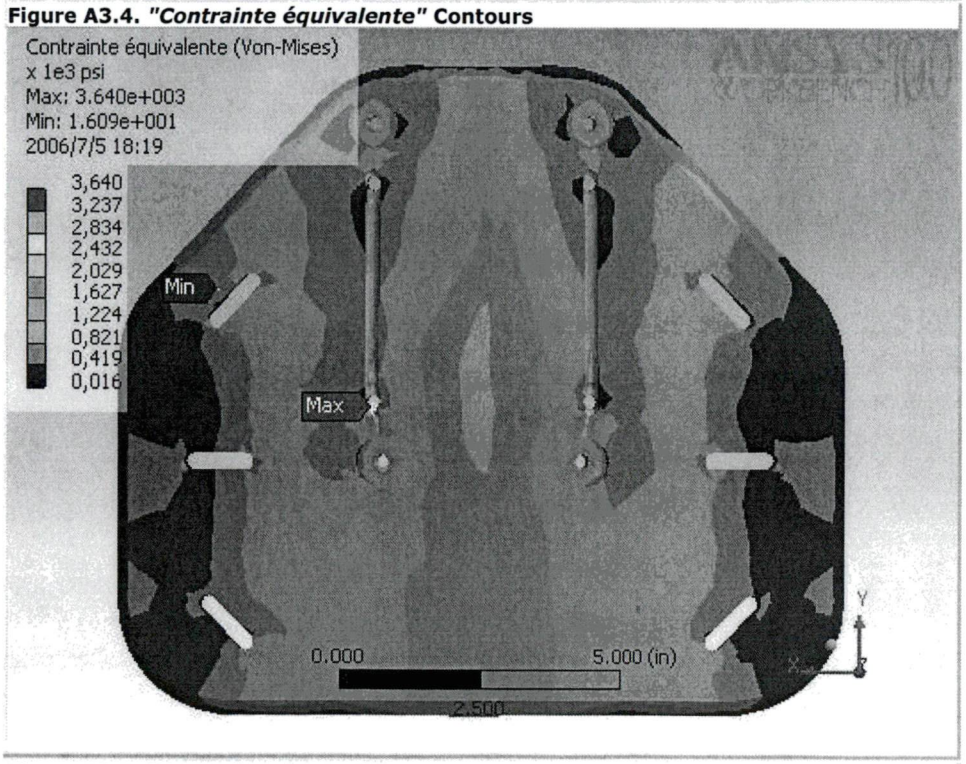


Figure A3.5. *"Contrainte équivalente"* Contours

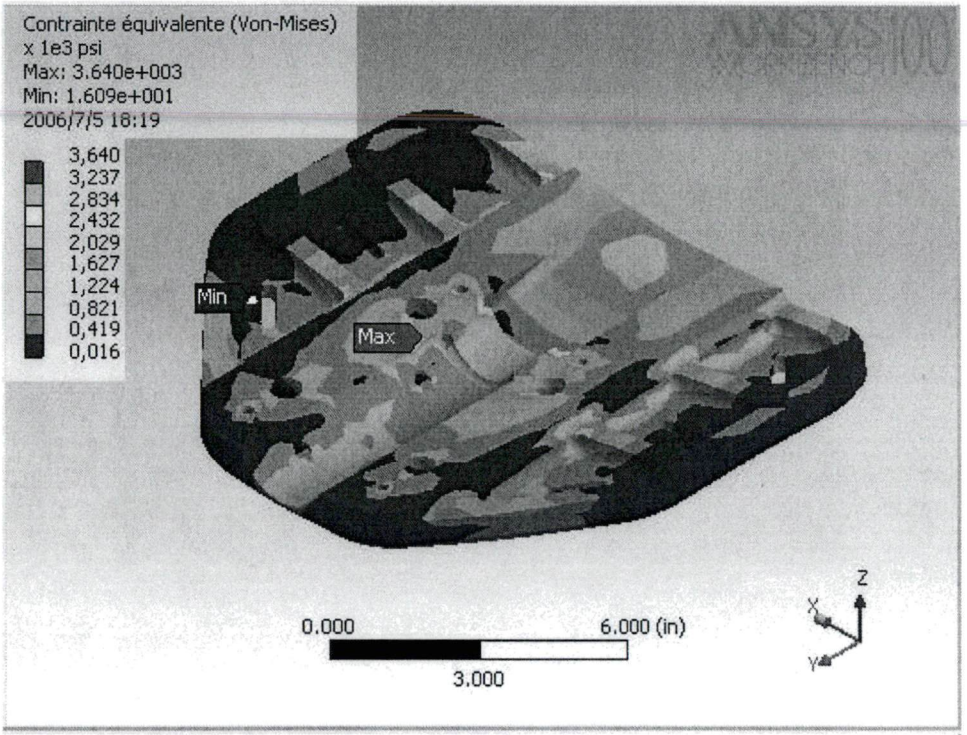


Figure A3.6. *"Déformée totale"* Contours

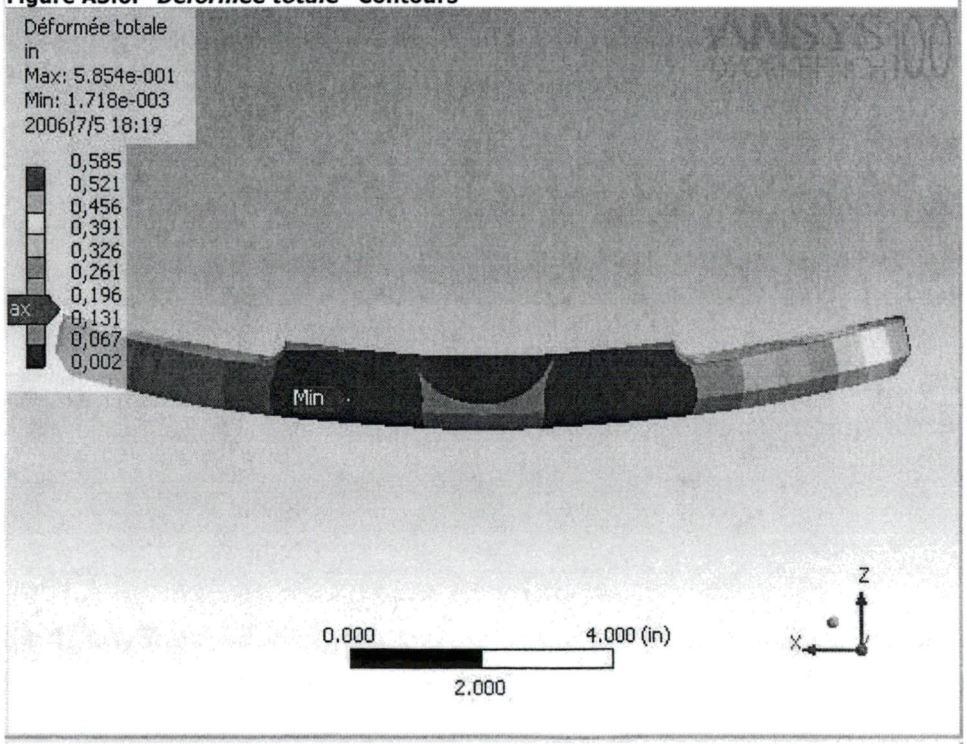
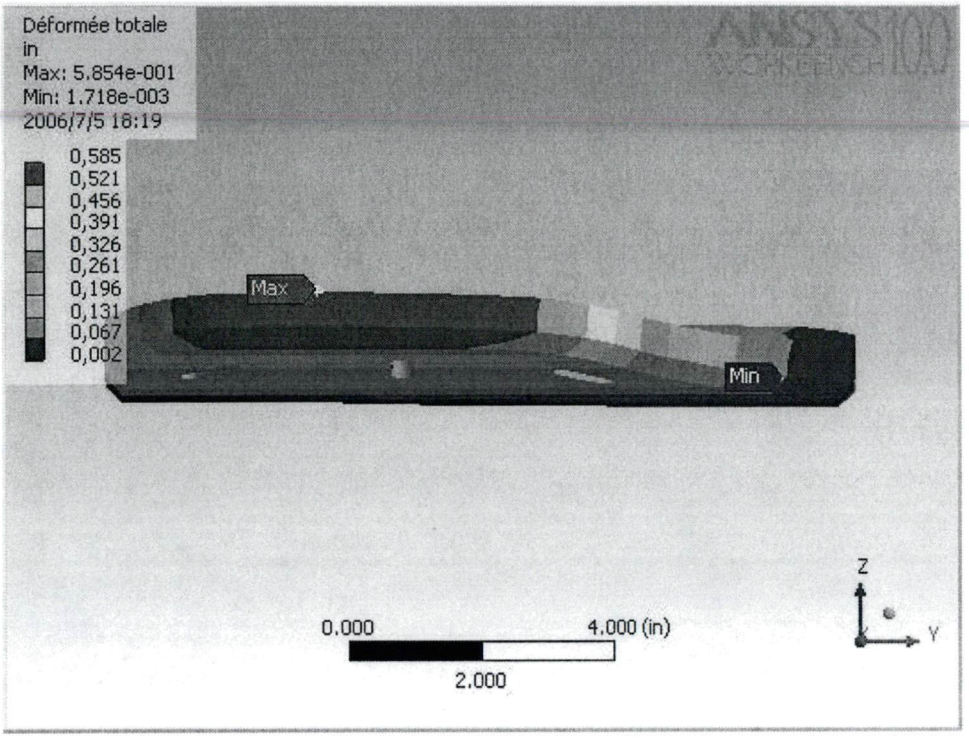


Figure A3.7. *"Déformée totale"* Contours



A4. Definition of "UHMW"

Tableau A4.1. *"UHMW"* Constant Properties

Nom	Valeur
Masse volumique	$3{,}4\times10^{-2}$ lbm/in³
Coefficient de Poisson	0,46
Module de Young	110 000,0 psi
Dilatation thermique	0,0 1/°F
Chaleur spécifique	0,0 BTU/lbm·°F
Conductivité thermique	0,0 BTU/s·in·°F
Perméabilité relative	0,0
Résistivité	0,0 Ohm·Cir-mil/in

A5. Distribution de ce rapport

Le tableau suivant indique les fichiers requis pour envoyer ce rapport à un serveur Web d'un réseau Internet ou Intranet ou pour changer son emplacement. Tous les fichiers doivent être gardés dans le même dossier que la page HTML.

A l'origine, ce rapport a été généré dans le dossier *"C:\Documents and Settings\francoisb.*\Application Data\Ansys\v100\"*.

Tableau A5.1. Fichiers inclus dans ce rapport

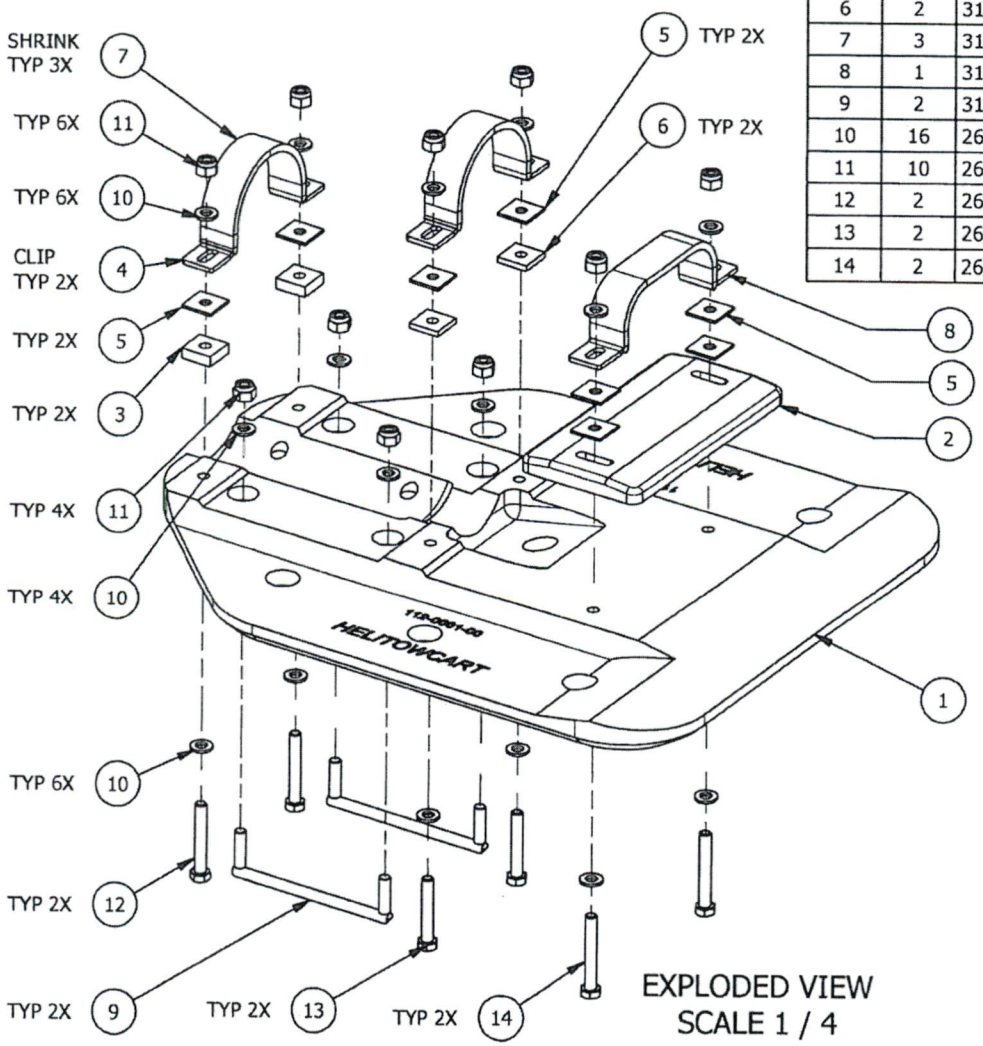
Nom de fichier	Description
"DSReport.htm"	Cette page HTML.
"StyleSheet.css"	Feuille de style en cascade utilisée pour la mise en forme de la page HTML.
"AnsCompanyLogo.gif"	Image de ANSYS affichée en haut de la page de titre.
"DS0001.jpg"	Figure A1.1. *"Maillage"* Geometry
"DS0002.jpg"	Figure A1.2. *"Environnement"* Geometry
"DS0003.jpg"	Figure A1.3. *"Contrainte équivalente"* Contours
"DS0004.jpg"	Figure A1.4. *"Contrainte équivalente"* Contours
"DS0005.jpg"	Figure A1.5. *"Contrainte équivalente"* Contours
"DS0006.jpg"	Figure A1.6. *"Déformée totale"* Contours
"DS0007.jpg"	Figure A1.7. *"Déformée totale"* Contours
"DS0008.jpg"	Figure A2.1. *"Maillage"* Geometry
"DS0009.jpg"	Figure A2.2. *"Environnement"* Geometry
"DS0010.jpg"	Figure A2.3. *"Contrainte équivalente"* Contours
"DS0011.jpg"	Figure A2.4. *"Contrainte équivalente"* Contours
"DS0012.jpg"	Figure A2.5. *"Contrainte équivalente"* Contours
"DS0013.jpg"	Figure A2.6. *"Déformée totale"* Contours
"DS0014.jpg"	Figure A2.7. *"Déformée totale"* Contours
"DS0015.jpg"	Figure A3.1. *"Maillage"* Geometry
"DS0016.jpg"	Figure A3.2. *"Environnement"* Geometry
"DS0017.jpg"	Figure A3.3. *"Contrainte équivalente"* Contours
"DS0018.jpg"	Figure A3.4. *"Contrainte équivalente"* Contours
"DS0019.jpg"	Figure A3.5. *"Contrainte équivalente"* Contours
"DS0020.jpg"	Figure A3.6. *"Déformée totale"* Contours
"DS0021.jpg"	Figure A3.7. *"Déformée totale"* Contours

NOTES:

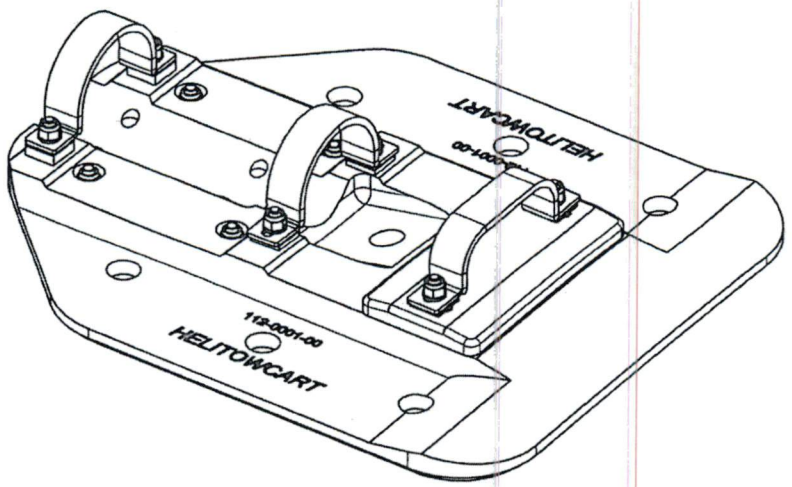
1. ICEBLADE ASSEMBLY CAN BE OMITTED FROM INSTALLATION (OPTIONAL)

2. FASTENERS LENGTH TO BE DETERMINED AT THE INSTALLATION

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0001-01	BEARPAW - PAD	UHMW	---	1" THK.
2	1	314-0022-01	BEARPAW - FILLER BLOCK REAR	UHMW	---	1/2" THK.
3	2	314-0012-01	BEARPAW - FILLER BLOCK 1/4	UHMW	---	1/4" THK.
4	2	314-0006-15	BEARPAW - U SHAPED CLIP	SS304	ANNEALED	GAGE 12
5	8	314-0014-01	BEARPAW - FILLER BLOCK 1/16	UHMW	---	1/16" THK.
6	2	314-0015-01	BEARPAW - FILLER BLOCK 1/8	UHMW	---	1/8" THK.
7	3	314-0016-05	BEARPAW - SHRINK (FIT-221)	POLYOLEFIN	---	1" DIA X 5" LG.
8	1	314-0023-15	BEARPAW - LOW U SHAPED CLIP	SS304	ANNEALED	GAGE 12
9	2	314-0005-15	ICEBLADE ASSEMBLY	STEEL	---	---
10	16	263-0001-17	WASHER (AN960-416)	STEEL	---	1/4
11	10	262-0001-17	NYLON NUT (AN365-428A)	STEEL	---	1/4
12	2	261-0002-17	HEX BOLT (AN4-15A)	STEEL	QQ-P-416A	1/4-28
13	2	261-0001-17	HEX BOLT (AN4-14A)	STEEL	---	---
14	2	261-0003-17	HEX BOLT (AN4-16A)	STEEL	QQ-P-416A	1/4-28



EXPLODED VIEW
SCALE 1 / 4



ASSEMBLED
SCALE 1 / 4

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	ISSUE FOR PRODUCTION	G.LAPOINTE	M. ZGELA	2006-04-25
B	MODIFY BOLT MODEL AND ADD FILLER BLOCK	G.LAPOINTE	M. ZGELA	2006-08-08
C	MODIFY BOLT MODEL AND ADD FILLER BLOCK AND SHRINK	G.LAPOINTE	M. ZGELA	2006-09-06
D	ADDITION OF STREAMLINE PAD CONFIGURATION	S.BERNIER	M. ZGELA	2009-10-22
E	ADDITION OF A REAR U SHAPED CLIP	S.BERNIER	M. ZGELA	2010-04-15
F	MODIFICATION OF LOW U SHAPED CLIP AND REAR FILLER BLOCK	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE — DATE: 2006/04/25

CHECKED BY: — DATE:

APPROVED TCCA BY: M. ZGELA — DATE: 2006/04/25

IF NOT SPECIFIED GENERAL TOLERANCE
1/X ± 1/32
X.XX ± 0.010"
X.XXX ± 0.005"
ANG. ± 1°

UNITS: INCH

SIZE: A

SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW ASSEMBLY

DRAWING NUMBER: 112-0001-00

REV: F

SHEET: 1 OF 1

112-0001-00 rev F

2013 11 11

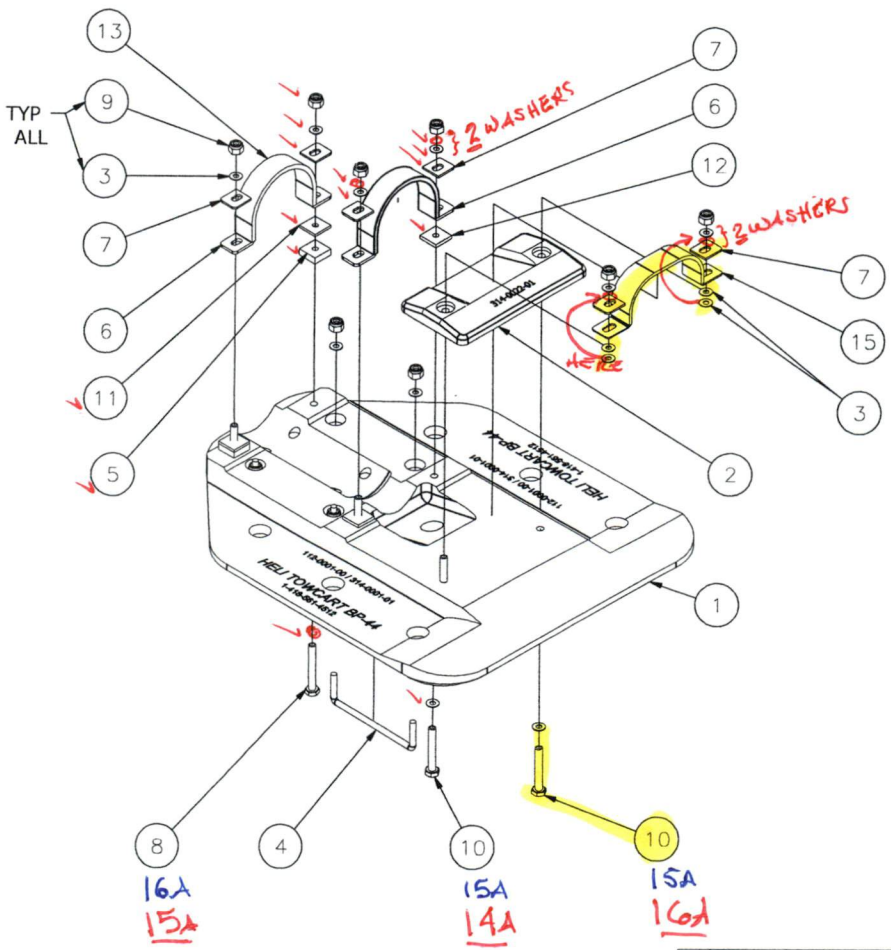
Boat: 2013 12 11 from Reine - Lue Tandy (Can Heli)

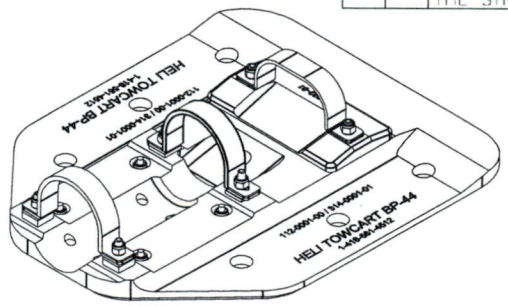
	1	DWG No 112-0001-00-E	1 SHT No OF 1

NOTE:
1. ICEBLADE ASSEMBLY CAN BE OMITTED FROM INSTALLATION (OPTIONAL)

2. FASTENERS LENGHT TO BE DETERMINED AT THE INSTALLATION

REVISIONS				
REWORKABLE	NONREWORKABLE	3 NOTED	4 NA	
ZONE	REV	DESCRIPTION	DR. & DATE	STRESS
	A	ISSUE FOR PRODUCTION		
	B	MODIFY BOLT MODEL AND ADD FILER BLOCK		
	C	MODIFY BOLT MODEL AND ADD FILLER BLOCK AND SHRINK		
	D	ADDITION OF STREAMLINE PAD CONFIGURATION		
	E	ADDITION OF A REAR U SHAPED CLIP IN THE STREAMLINE PAD CONFIGURATION		





ISO
SCALE 1 / 4

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SIZE
15	1	314 0023 15 A	BEARPAW U SHAPED CLIP REAR	STEEL	
13	3	314 0016 05 A	BEARPAW SHRINK 1X5	RUBBER	
12	2	314 0015 01 A	BEARPAW FILLER BLOCK 1/8	UHMW	1/8
11	2	314 0014 01 A	BEARPAW FILLER BLOCK 3/32	UHMW	3/32
10	4	261 0003 17 A	BOLT AN4 15A	STEEL	1/4
9	10	262 0001 17 A	NUT MS20 365 428	STEEL	1/4
8	2	261 0003 17 A	BOLT AN4 16A	STEEL	1/4
7	6	314 0007 15 B	BEARPAW SLOTTED CLIP SUPPORT	STEEL	
6	2	314 0006 15 B	BEARPAW U SHAPED CLIP	STEEL	
5	2	314 0012 01 A	BEARPAW FILLER BLOCK 1/4	UHMW	1/4
4	2	314 0005 15 A	BEARPAW ICE BLADE ASSEMBLY	STEEL	
3	20	263 0001 17 A	WASHER AN960 416	STEEL	1/4
2	1	314 0022 01 A	BEARPAW FILLER BLOCK REAR	UHMW	1/2
1	1	314 0001 01 B	BEARPAW PAD	UHMW	

DASH NO	NEXT ASSY	QTY PER ACFT	MODEL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: .XX ±0.030, .XXX ±0.010
ANGULAR: BEND ANGLES ± 2°
ALL MACHINE SURFACE ✓
MATERIAL:
MATERIAL SPEC:
SIZE:
FINISH:
PROTECTION:
IDENTIFYING METHOD:

DRAWN: S. BERNIER	15/04/2010
DESIGNED: S. BERNIER	15/04/2010
CHECKED:	
STRESS:	
WEIGHT:	
APPROVED:	
APPROVED M. ZOFF A	15/04/2010

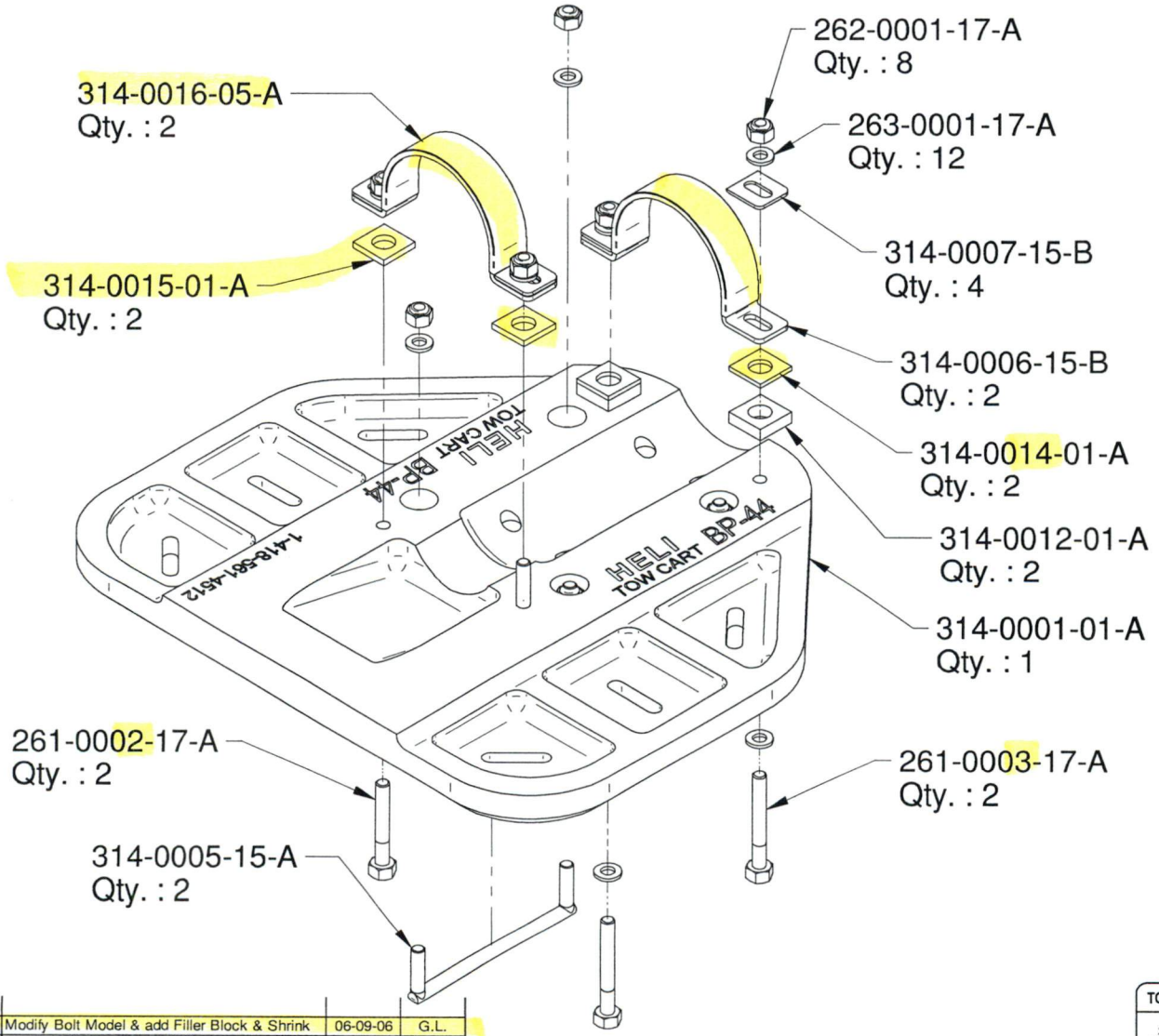
HELI TOW CART
BEARPAW STREAMLINE ASSEMBLY

CAGE CODE	SIZE	DRAWING NO.	REV
-	B	112-0001-00-E	E

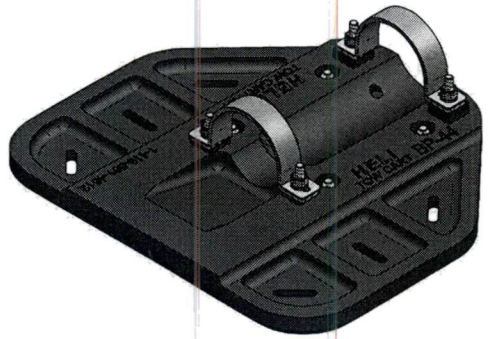
SCALE: NTS | SHEET 1 OF 1

112-0001-00-E

D. Barbeau 2010.04-24



N°	Qty	Description	Part #
1*	1	Bearpaw - Pad	314-0001-01-A
2*	2	Bearpaw - Iceblade assembly	314-0005-15-A
3*	2	Bearpaw - U Shaped clip	314-0006-15-B
4*	4	Bearpaw - Slotted clip support	314-0007-15-B
5*	8	Nut MS20-365-428 = MS21044N4	262-0001-17-A
6*	12	Washer AN960-416	263-0001-17-A
7*	2	Bolt AN4-15A	261-0002-17-A
8*	2	Bearpaw - Filler Block 1/4"	314-0012-01-A
9*	2	Bolt AN4-16A	261-0003-17-A
10*	2	Bearpaw - Shrink 1"x5"	314-0016-05-A
11*	2	Bearpaw - Filler Block 1/8"	314-0015-01-A
12*	2	Bearpaw - Filler Block 3/32"	314-0014-01-A



NOTE : Iceblade assembly can be omitted from installation (Optional)

Rev.	Description	Date	By
R05	Modify Bolt Model & add Filler Block & Shrink	06-09-06	G.L.
R04	Modify Bolt Model & add Filler Block	08-08-06	G.L.
R03	Issue for production	25-04-06	G.L.

Vanair inc.
860, Marie-Victorin
St-Nicolas, Lévis (Québec)
Canada, G7A 3S9
Tél. : (418) 561-4512
Fax : (418) 836-2291
www.hellowcart.com

TOLERANCES
1/X ± 1/32"
X.XX ± 0.010"
X.XXX ± 0.005"
ANGLE ± 1°
PROJECTION

Titre / Title: Bearpaw Assembly
Matériel / Material:

Dessiné par / Drawing by:	Date: (yyyy-mm-dd)	Format	Echelle / Scale	Page #
G. Lapointe	2006-04-25	B	N/A	1 de 1

Vérifié par / Checked by:	Date: (yyyy-mm-dd)	Numéro dessin / Drawing Number	Rev.#
		VNR083	R05

Approuvé par / Approved by:	Date: (yyyy-mm-dd)	Numéro de pièce / Part Number	Rev.#
D. Bourbeau	2006-09-07	112-0001-00-C	

112-0001-00-C

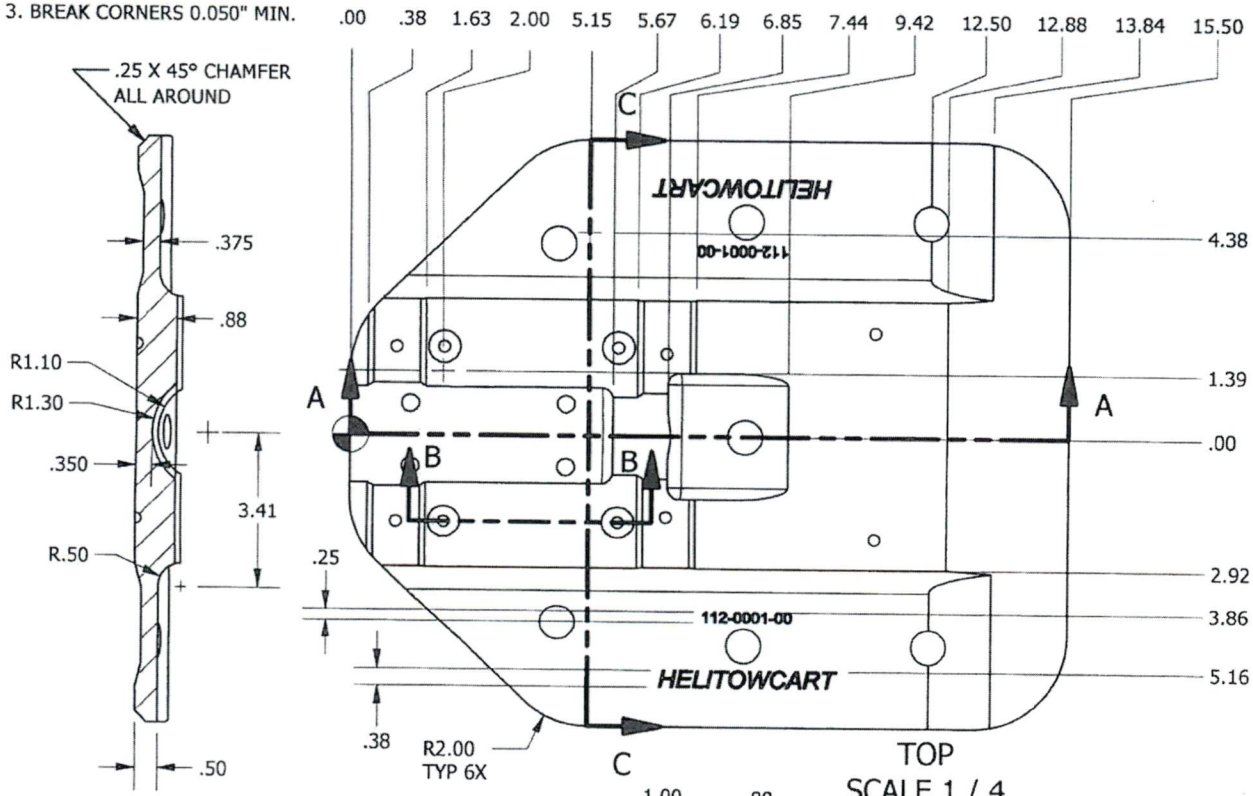
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING

2. REMOVE ALL BURRS AND SHARP EDGES 0.020" MAX.

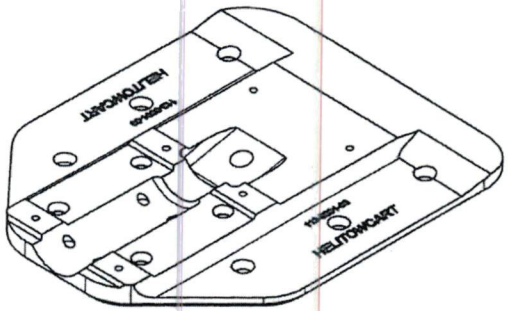
3. BREAK CORNERS 0.050" MIN.

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0001-01	BEARPAW - PAD	UHMW	---	1" THK.

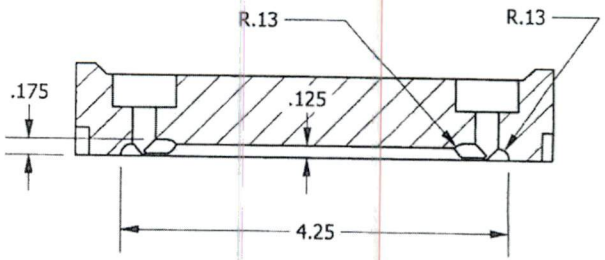


SECTION C-C
SCALE 1 / 4

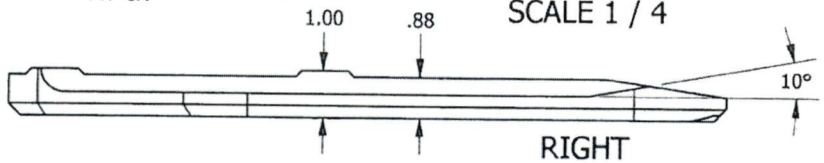
TOP
SCALE 1 / 4



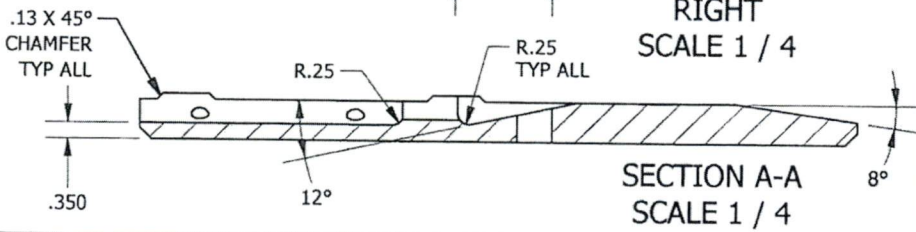
ISO
SCALE 1 / 6



SECTION B-B
SCALE 1 / 2



RIGHT
SCALE 1 / 4



SECTION A-A
SCALE 1 / 4

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	ISSUE FOR PRODUCTION	G.LAPOINTE	M. ZGELA	2006-04-24
B	ADDITION OF STREAMLINE PAD CONFIGURATION	S. BERNIER	M. ZGELA	2009-10-22
C	MODIFIED ENGRAVING, CHANGED ZONES FOR DAMAGE TOLERANCE	R.B.R.	M. ZGELA	2013-08-09
D	CHANGED MANUFACTURING TOLERANCES	R.B.R.	M. ZGELA	2016-05-30

DRAFTED BY: G. LAPOINTE	DATE: 2006/04/24	**Helitowcart** (Vanair inc.) St-Nicolas, Levis, Qc, Canada www.helitowcart.com
CHECKED BY:	DATE:	DEFINITION: BEARPAW PAD
APPROVED TCCA BY: M. ZGELA	DATE: 2006/04/24	
IF NOT SPECIFIED GENERAL TOLERANCE X.XX ± 0.030" X.XXX ± 0.010" ANG. ± 1°	UNITS: INCH SIZE: A SCALE: N/A	DRAWING NUMBER: 314-0001-01 REV: D SHEET: 1 OF 3

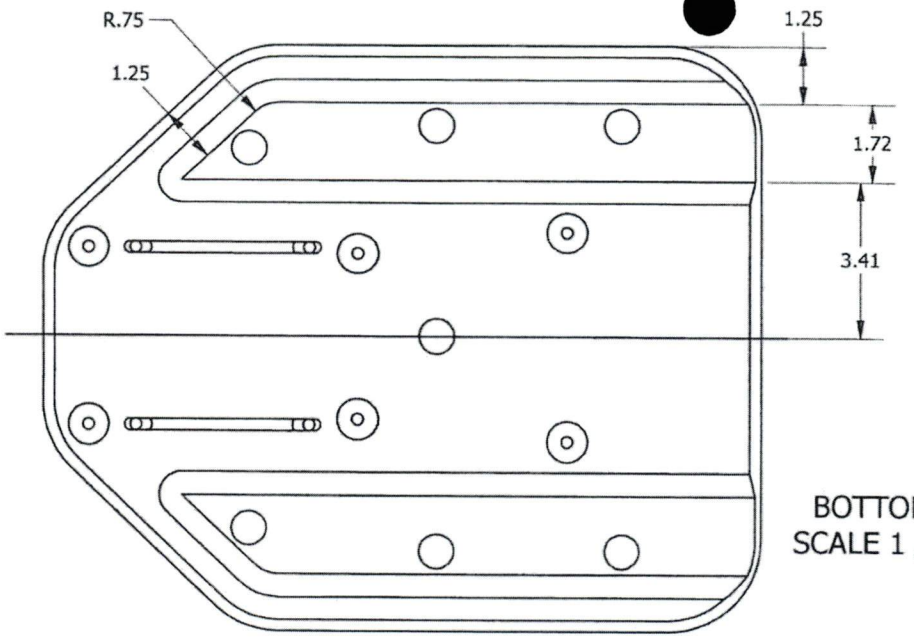
A. Barbeau 2016 06 22

314-0001-01 rev D

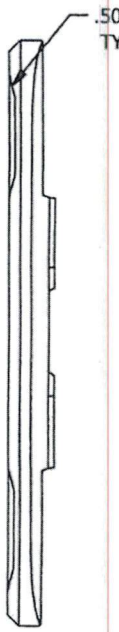
TiP: Aviser Fo-RN
au moment de faire
PO, de commander
du "1" fort", i.e.

1" TOLERANCE +

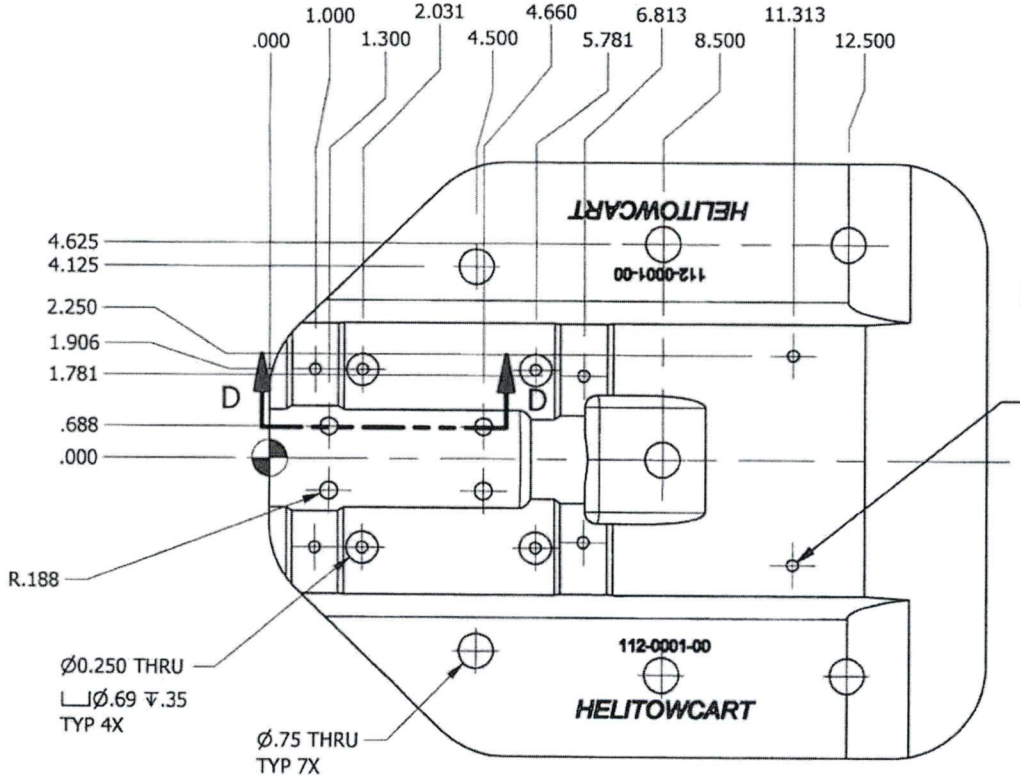
pour faciliter
machinage



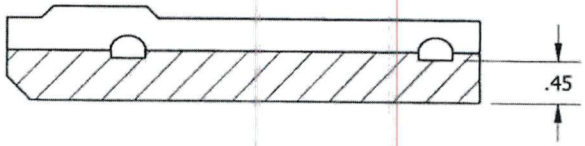
BOTTOM
SCALE 1 / 4



REAR
SCALE 1 / 4

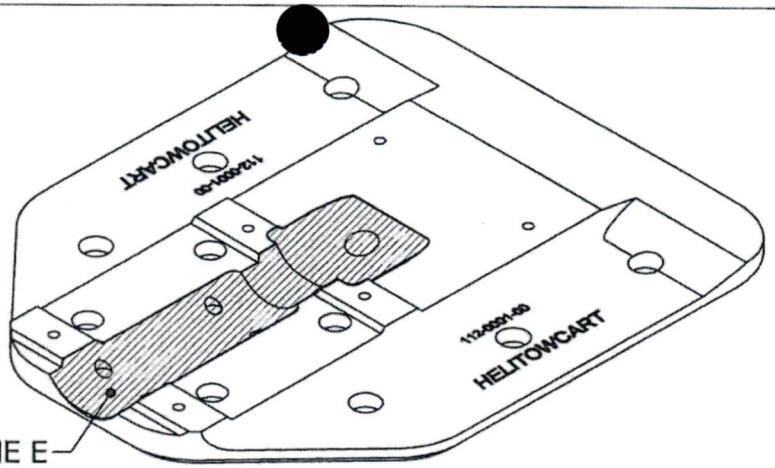


TOP
SCALE 1 / 4

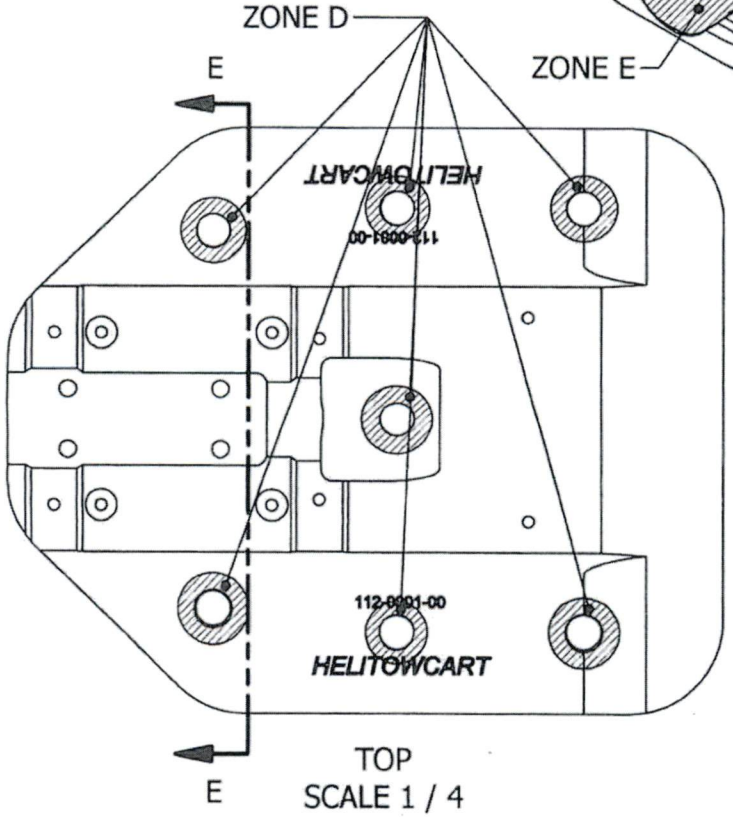


SECTION D-D
SCALE 1 / 2

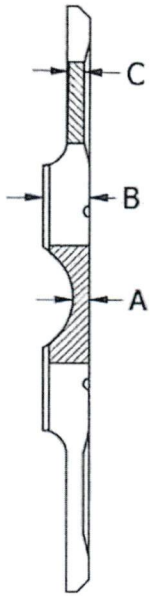
DRAFTED BY: G. LAPOINTE	DATE: 2006/04/24	**Helitowcart** (Vanair inc.) St-Nicolas, Levis, Qc, Canada www.helitowcart.com
CHECKED BY:	DATE:	DEFINITION: BEARPAW PAD
APPROVED TCCA BY: M. ZGELA	DATE: 2006/04/24	
IF NOT SPECIFIED GENERAL TOLERANCE	UNITS: INCH	DRAWING NUMBER: 314-0001-01 REV D
X.XX ± 0.030" X.XXX ± 0.010" ANG. ± 1°	SIZE A	
	SCALE: N/A	SHEET: 2 OF 3



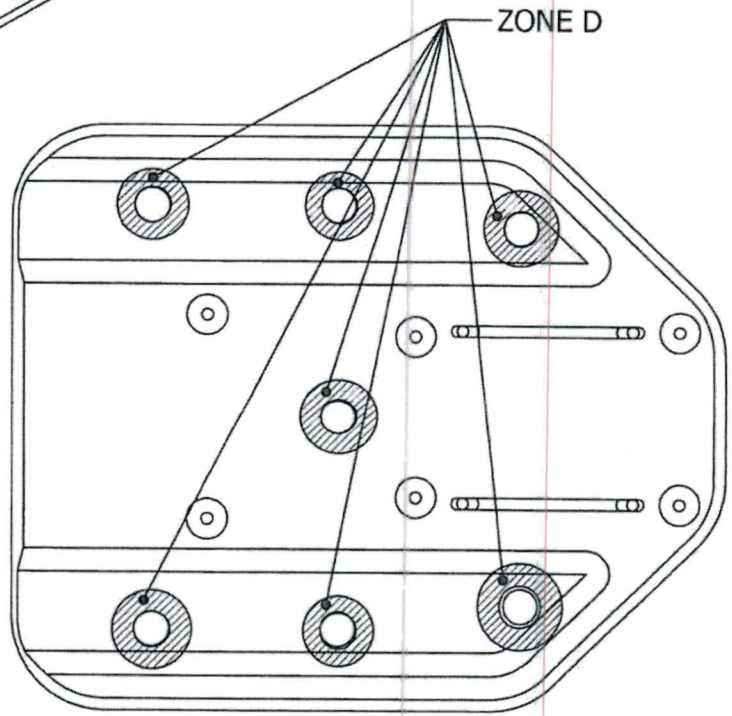
ISO
SCALE 1 / 4



TOP
SCALE 1 / 4



SECTION E-E
SCALE 1 / 4



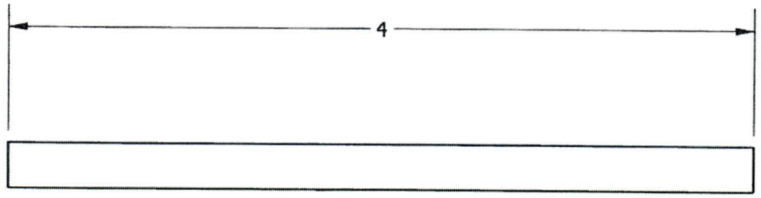
DRAFTED BY: G. LAPOINTE	DATE: 2006/04/24	**Helitowcart** (Vanair inc.) St-Nicolas, Levis, Qc, Canada www.helitowcart.com
CHECKED BY:	DATE:	DEFINITION: BEARPAW PAD
APPROVED TCCA BY: M. ZGELA	DATE: 2006/04/24	
IF NOT SPECIFIED GENERAL TOLERANCE X.XX ± 0.030" X.XXX ± 0.010" ANG. ± 1°	UNITS: INCH SIZE A SCALE: N/A	DRAWING NUMBER: 314-0001-01 REV D SHEET: 3 OF 3

NOTES:

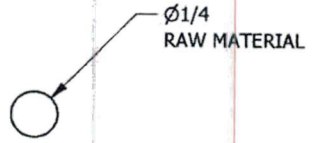
1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

2. REMOVE ALL BURRS AND SHARP EDGES 0.020" MAX

ITEM	QTY	PART NUM	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0002-1[redacted]	BEARPAW - ICE BLADE ASSEMBLY	SS304	ANNEALED	ROD 1/4" DIA.



FRONT
SCALE 1 : 1



RIGHT
SCALE 1 : 1

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-04-24
B	REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE — DATE: 2006-04-24
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2006-04-24
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW ICEBLADE

DRAWING NUMBER: 314-0002-15 — REV: B

SHEET: 1 OF 1

314-0002-15 rev B

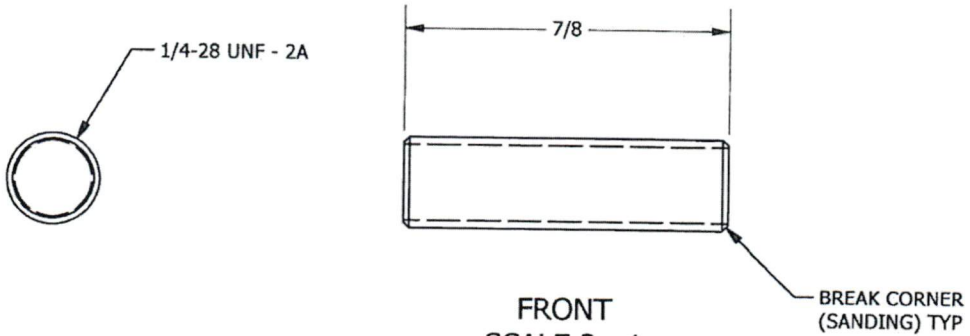
R. Rafleau 2013 11 11

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING

2. REMOVE ALL BURRS AND SHARP EDGES 1/64" MAX. ENSURE EDGES ARE SMOOTH.

ITEM	QTY	PART NUM	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0004-15	BEARPAW - ICEBLADE THREADED ROD	SS304	ANNEALED	1/4-28 UNF - 2A



FRONT
SCALE 2 : 1

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-04-24
B	REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE — DATE: 2006-04-24
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2006-04-24
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW ICEBLADE THREADED ROD

DRAWING NUMBER: 314-0004-15 — REV: B

SHEET: 1 OF 1

R. Bouleau 2013 11 04

314-0004-15 rev B

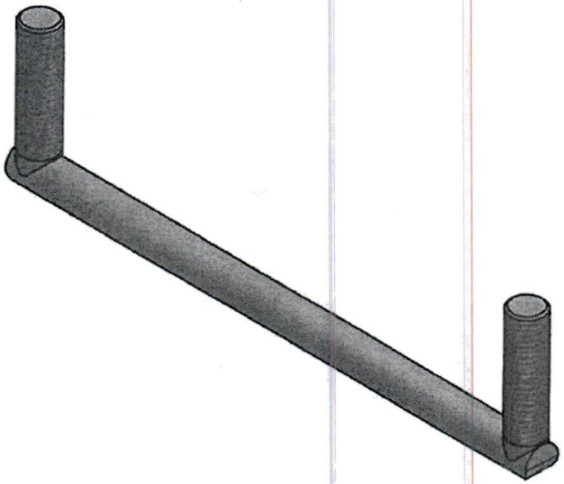
NOTES:

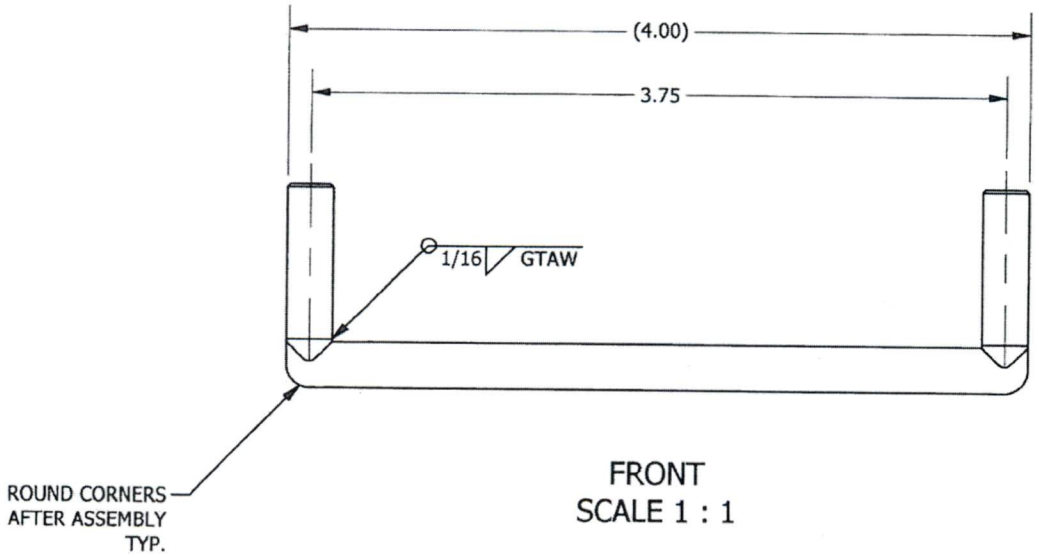
1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

2. REMOVE ALL BURRS AND SHARP EDGES 1/64" MAX.

3. FILLER MATERIAL AWS A-5.9 / ASME SFA-5.9 MGSS308L

ITEM	QTY	PART NUM	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0002-15	BEARPAW - ICE BLADE ASSEMBLY	SS304	ANNEALED	ROD 1/4" DIA.
2	2	314-0004-15	BEARPAW - ICEBLADE THREADED ROD	SS304	ANNEALED	1/4-28 UNF - 2A





FRONT
SCALE 1 : 1

NOTE AU FOURNISSEUR:
ÉBAVURER TOUT LE TOUR R1/64"
PASSER DANS L'ACIDE
REMPLIR FICHE D'INSPECTION CLIENT

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-04-24
B	REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE	DATE: 2006-04-24	**Helitowcart** (Vanair inc.) St-Nicolas, Levis, Qc, Canada www.helitowcart.com
CHECKED BY:	DATE:	DEFINITION: BEARPAW ICEBLADE ASSEMBLY
APPROVED TCCA BY: M. ZGELA	DATE: 2006-04-24	
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°	UNITS: INCH SIZE: A SCALE: N/A	DRAWING NUMBER: 314-0005-15 REV B SHEET: 1 OF 1

314-0005-15 rev B

D. Bateau 2013 11 4

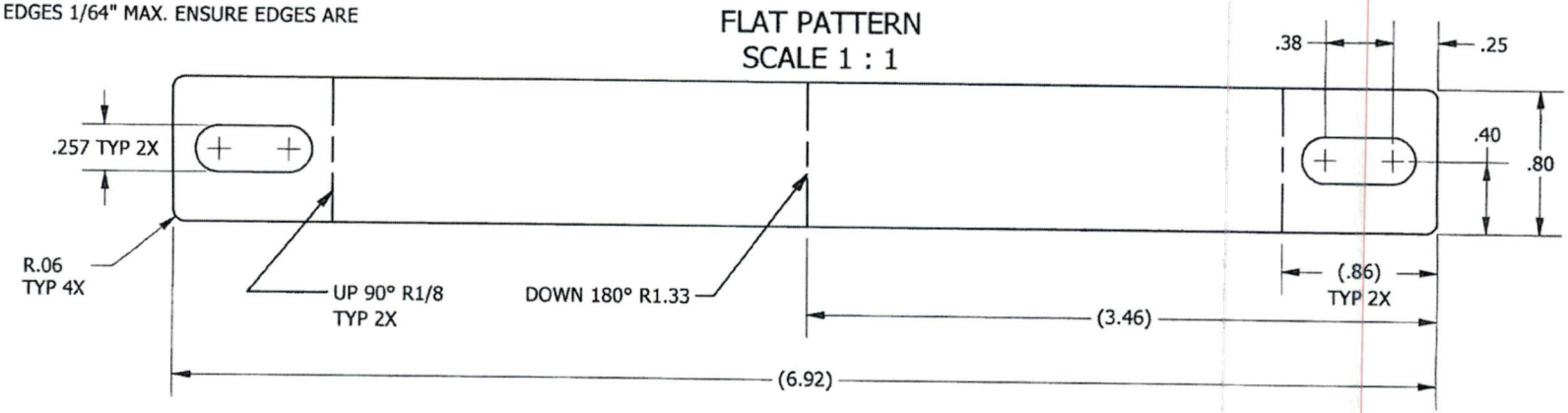
NOTES:

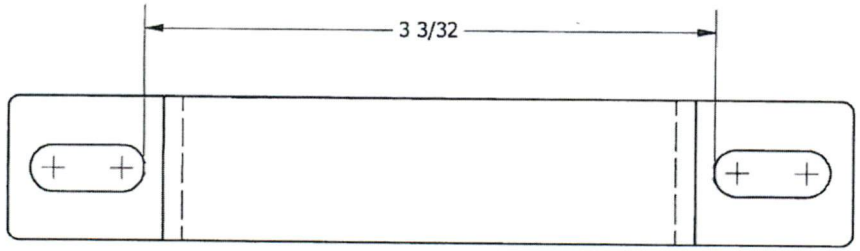
1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING

2. REMOVE ALL BURRS AND SHARP EDGES 1/64" MAX. ENSURE EDGES ARE SMOOTH.

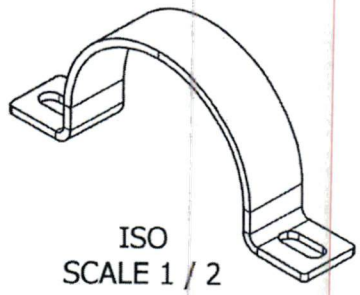
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0006-15	BEARPAW - U SHAPED CLIP	SS304	ANNEALED	GAGE 12

FLAT PATTERN
SCALE 1 : 1

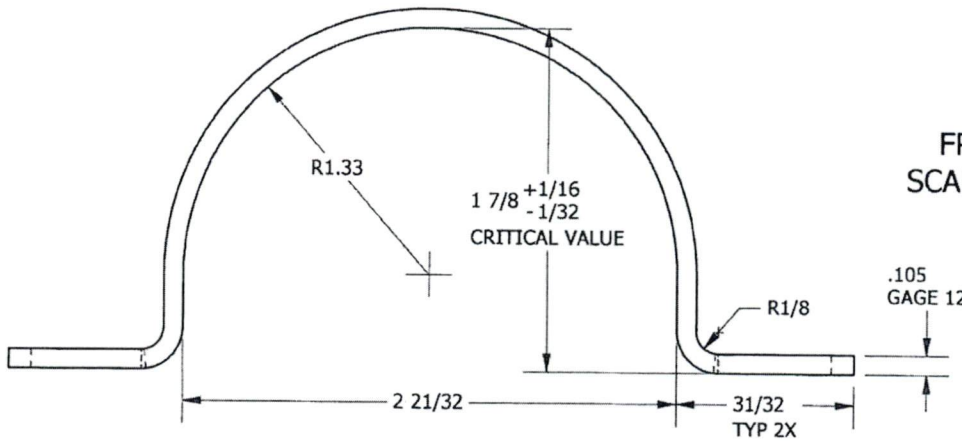




TOP
SCALE 1 : 1



ISO
SCALE 1 / 2



FRONT
SCALE 1 : 1

NOTE AU FOURNISSEUR:
ÉBAVURER TOUT LE TOUR R1/64"
PLIER, ROULER GABARIT _____
PASSER DANS L'ACIDE
REMPLIR FICHE D'INSPECTION CLIENT

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	ISSUE FOR PRODUCTION	G.LAPOINTE	M. ZGELA	2006-04-24
B	0.800 WAS 0.750 - GAGE 12 WAS 14	G.LAPOINTE	M. ZGELA	2006-07-31
C	MODIFIED BEND RADIUS FROM 1/16" TO 0.120"	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE	DATE: 2006/04/24	
CHECKED BY:	DATE:	
APPROVED TCCA BY: M. ZGELA	DATE: 2006/04/24	
IF NOT SPECIFIED GENERAL TOLERANCE	UNITS: INCH	
1/X ± 1/32 X.XX ± 0.010" X.XXX ± 0.005" ANG. ± 1°	SIZE: A	
	SCALE: N/A	

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION:
BEARPAW
U-SHAPED CLIP

DRAWING NUMBER: 314-0006-15 REV: C

SHEET: 1 OF 1

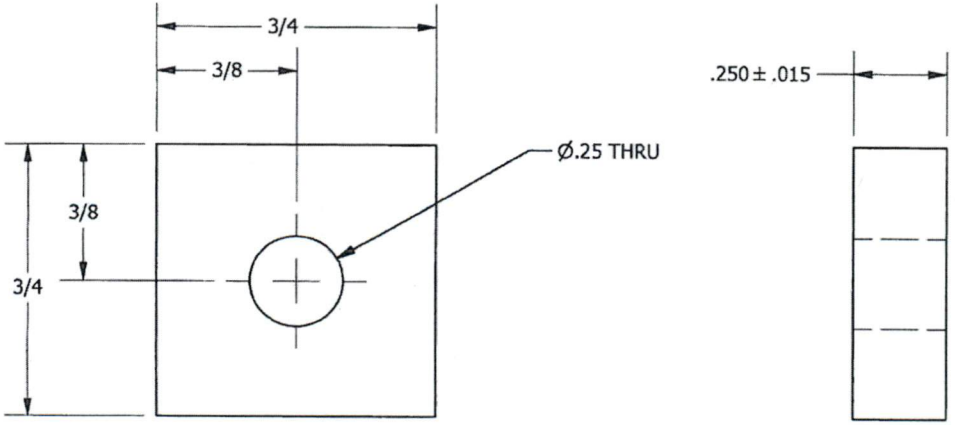
314-0006-15 rev C

D. Lapointe 2013 11 11

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0012-01	BEARPAW - FILLER BLOCK 1/4	UHMW	---	1/4" THK.



FRONT
SCALE 2 : 1

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-08-08
B	HOLE 0.25", REMOVED REV. LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE — DATE: 2006-09-06
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2006-08-08
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW FILLER BLOCK 1/4"
DRAWING NUMBER: 314-0012-01
REV: B
SHEET: 1 OF 1

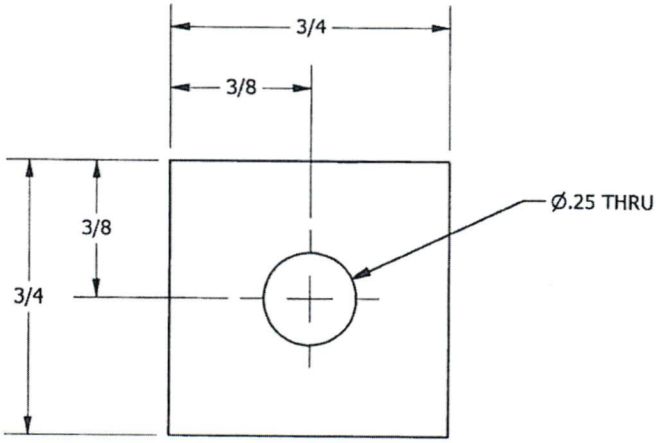
314-0012-01 Rev B

D. Lapointe 2013 11 01

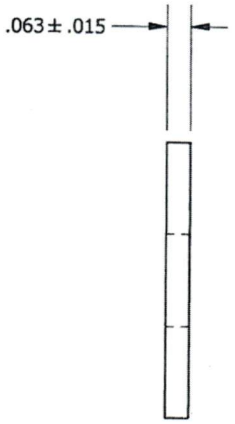
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0014-01	BEARPAW - FILLER BLOCK 1/16	UHMW	---	1/16" THK.



FRONT
SCALE 2 : 1



RIGHT
SCALE 2 : 1

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-09-06
B	HOLE: 0.25", THICKNESS: 0.063", REMOVED REV. LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE — DATE: 2006-09-06
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2006-09-06
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW FILLER BLOCK 1/16"

DRAWING NUMBER: 314-0014-01 — REV: B

SHEET: 1 OF 1

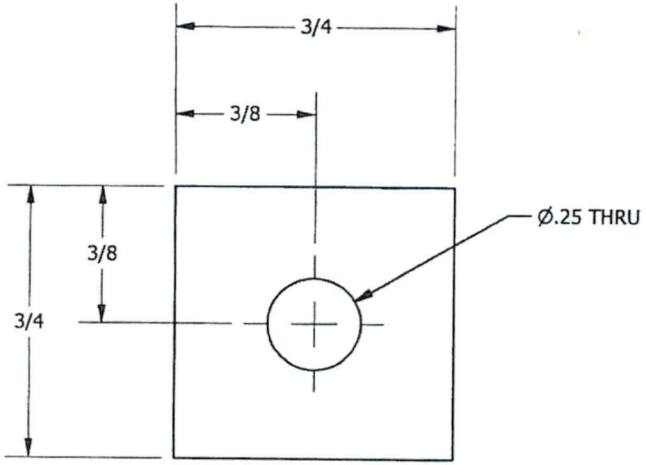
314-0014-01 rev B

D. Baker 2013 11 11

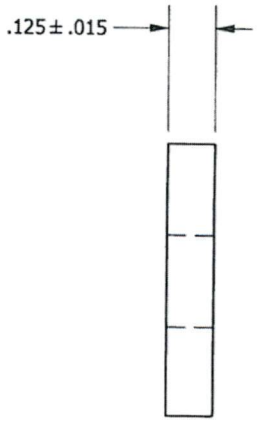
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-00[redacted]1	BEARPAW - FILLER BLOCK 1/8	UHMW	---	1/8" THK.



FRONT
SCALE 2 : 1



RIGHT
SCALE 2 : 1

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	INITIAL ISSUE	G.LAPOINTE	M. ZGELA	2006-09-06
B	0.25" HOLE, REMOVED REVISION LETTER FROM P/N	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: G. LAPOINTE — DATE: 2006-09-06
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2006-09-06
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW FILLER BLOCK 1/8"
DRAWING NUMBER: 314-0015-01
REV: B
SHEET: 1 OF 1

314-0015-01 rev B

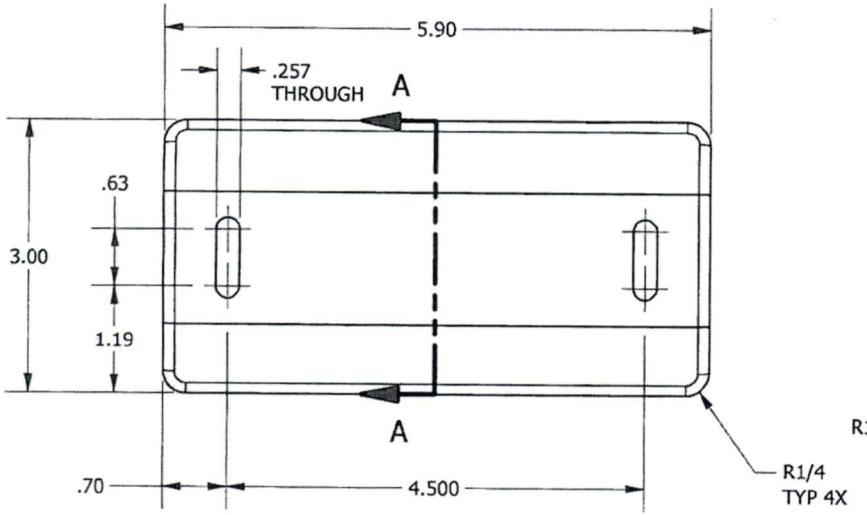
2013 11 11

NOTES:

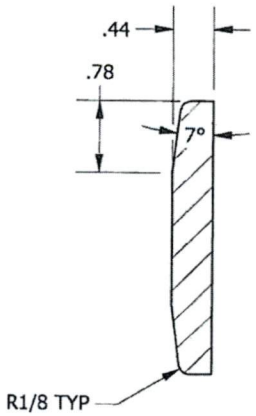
1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING.

2. REMOVE ALL BURRS AND SHARP EDGES 0.020" MAX. ENSURE EDGES ARE SMOOTH.

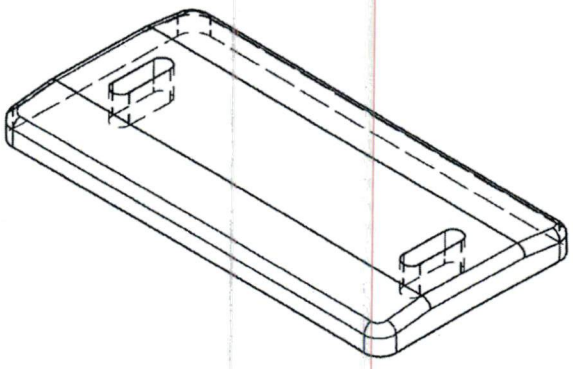
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0022-[illegible]	BEARPAW - FILLER BLOCK REAR	UHMW	---	1/2" THK.



TOP
SCALE 1 / 2



SECTION A-A
SCALE 1 / 2



ISO
SCALE 1 / 2

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	ISSUE FOR PRODUCTION	S. BERNIER	M. ZGELA	2009-10-22
B	MODIFICATION OF ANGLE AND ADDITION OF SLOTTED HOLES	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: S. BERNIER — DATE: 2009-10-22
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2009-10-22
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW FILLER BLOCK REAR

DRAWING NUMBER: 314-0022-01 — REV: B

SHEET: 1 OF 1

314-0022-01 rev B

R. Bernier 2013 11 11

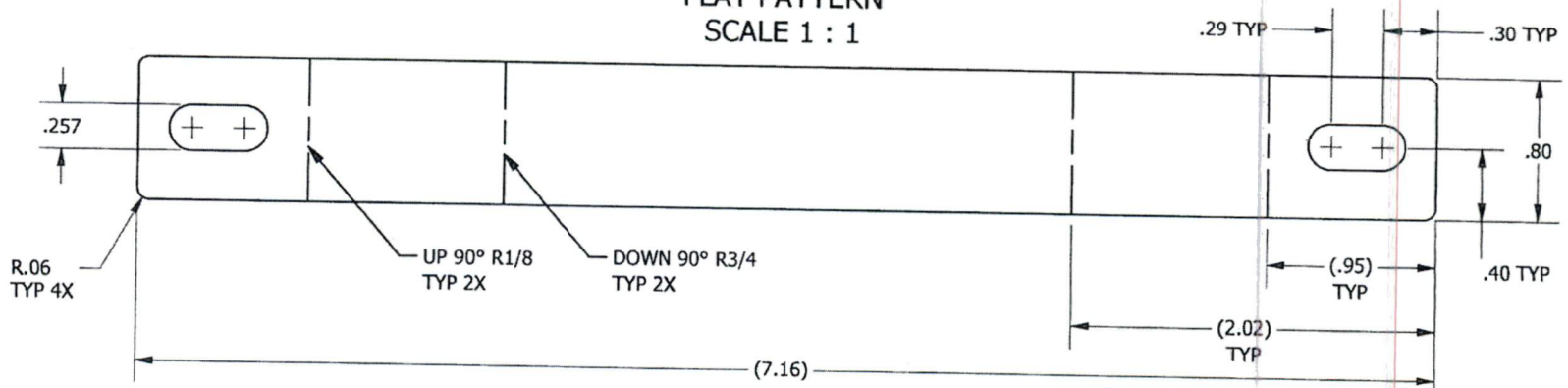
NOTES:

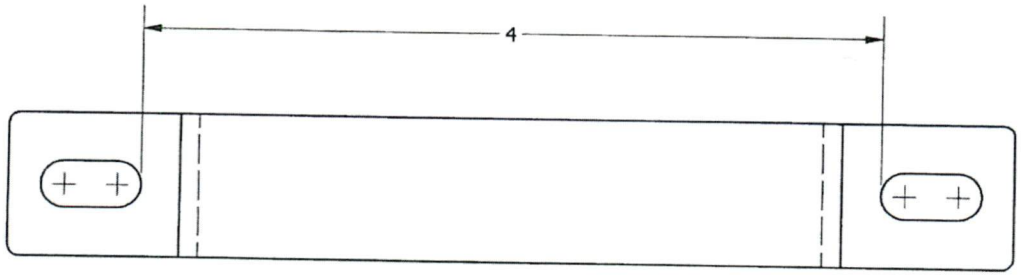
1. INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.5M 1994, DIMENSIONS AND TOLERANCING

2. REMOVE ALL BURRS AND SHARP EDGES 1/64" MAX. ENSURE EDGES ARE SMOOTH.

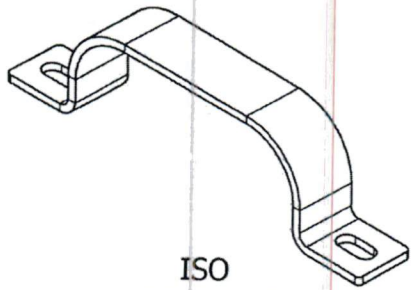
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	SIZE
1	1	314-0023-15	BEARPAW - LOW U SHAPED CLIP	SS304	ANNEALED	GAGE 12

FLAT PATTERN
SCALE 1 : 1

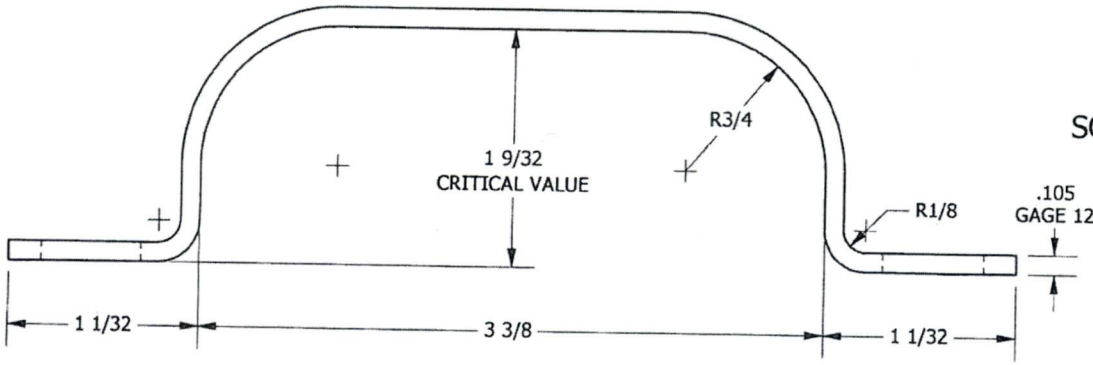




TOP
SCALE 1 : 1



ISO
SCALE 1 / 2



FRONT
SCALE 1 : 1

NOTE AU FOURNISSEUR:
ÉBAVURER TOUT LE TOUR R1/64"
PLIER, ROULER GABARIT _____
PASSER DANS L'ACIDE
REMPLIR FICHE D'INSPECTION CLIENT

REVISION				
REV	DESCRIPTION	REVISED BY	APPROVED	DATE
A	ISSUE FOR PRODUCTION	S. BERNIER	M. ZGELA	2010-04-15
B	MODIFIED BEND RADIUS (R3/4) AND REDUCED HEIGHT	R.B.R.	M. ZGELA	2013-08-09

DRAFTED BY: S. BERNIER — DATE: 2010-04-15
CHECKED BY: — DATE:
APPROVED TCCA BY: M. ZGELA — DATE: 2010-04-15
IF NOT SPECIFIED GENERAL TOLERANCE: 1/X ± 1/32, X.XX ± 0.010", X.XXX ± 0.005", ANG. ± 1°
UNITS: INCH
SIZE: A
SCALE: N/A

Helitowcart (Vanair inc.)
St-Nicolas, Levis, Qc, Canada
www.helitowcart.com

DEFINITION: BEARPAW
LOW U-SHAPED CLIP

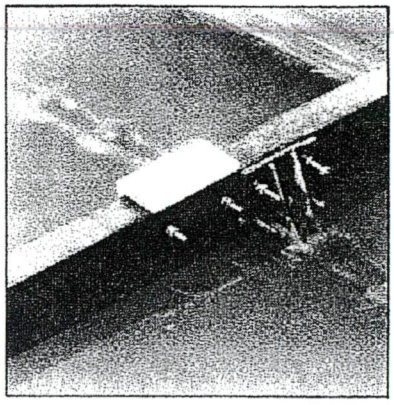
DRAWING NUMBER: 314-0023-15 — REV: B

SHEET: 1 OF 1

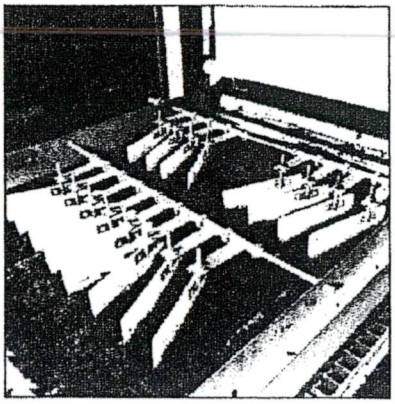
314-0023-15 rev B

314-0008-01 rev A

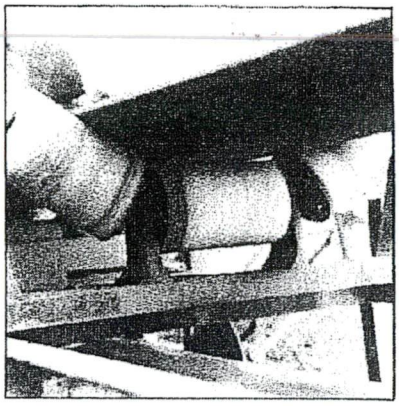
Propriétés du UHMW TIVAR®



TIVAR flight wear shoes do not corrode, and outwear shoes made from metals, urethanes and other plastics.



TIVAR is used in many OEM applications to solve abrasion and corrosion problems. The scrapers on this belt press are of TIVAR.



Conveyor rollers lined with TIVAR reduce belt wear. Wet sludge doesn't build up as on conventional rollers.

PHYSICAL PROPERTIES

PROPERTY		TEST METHOD	UNIT	TYPICAL VALUE
Specific Gravity		ASTM D-792	g/cm³	0.94
Yield Strength	@73°F	ASTM D-638	p.s.i.	3400
Ultimate Tensile Strength	@73°F	ASTM D-638	p.s.i.	6800
Break Elongation	@73°F	ASTM D-638	%	450
Yield Strength	@250°F	Stress Strain Diagram	p.s.i.	700
Ultimate Tensile Strength	@250°F	Stress Strain Diagram	p.s.i.	3300
Break Elongation	@250°F	Stress Strain Diagram	%	900
Hardness —Rockwell "R" Scale		ASTM D-785	—	64
Shore "D" Scale		ASTM D-2240	—	67
Flexural Modulus of elasticity		Bend Creep/1 min. value	p.s.i.	110,000
Shear Strength		ASTM D-732	p.s.i.	3500
Izod Impact +	@23°c	ASTM D-256A	ft-lbs/in. notch	No Break
−	@140°c	ASTM D-256A	ft-lbs/in. notch	No Break
Environmental Stress Cracking	@F_{50}	ASTM D-1693 Mod	hrs.	6000
Water Absorption		ASTM D-570	—	NIL

COEFFICIENT OF FRICTION

UHMW Polymer has a lower coefficient of friction than glass. Together with its self-lubricating characteristics it is an ideal material for bearings, bushings, valves, wear strips or any application where sliding contact is encountered.

MATERIALS	STATIC	KINETIC	TEST METHOD
Mild Steel vs. Mild Steel	0.30-0.40	0.25-0.35	
Mild Steel vs. TIVAR-100	0.15-0.20	0.12-0.20	ASTM D-1894
TIVAR-100 vs. TIVAR-100	0.20-0.30	0.20-0.30	

DEFORMATION UNDER COMPRESSION - %							PERMANENT DEFORMATION AFTER REMOVAL OF LOAD	
TEMP°F	PSI COMPRESSION	INITIAL LOADING 10 MIN.	100 MIN.	1000 MIN.	1 DAY	56 DAYS	AFTER 1 MIN.	AFTER 24 HRS.
68°	282	1.5	1.7	1.8	1.9	2.4	0.9	0.6
	570	2.4	2.5	2.7	3.0	4.0	1.8	1.2
	850	3.0	4.0	4.5	5.0	5.1	2.7	1.8
	1140	4.0	5.0	6.0	7.0	7.5	3.6	2.4
	1420	5.0	6.5	7.5	8.0	9.0	4.5	2.9
	1700	7.0	7.5	8.0	10.0	11.0	5.4	3.5

CHEMICAL RESISTANCE

Hydrochloric acid (conc.) - no appreciable reaction up to 80°C

Nitric acid (20%) - less than 20% decrease in yield stress and ultimate tensile strength up to 80°C.

Sulphuric acid (50%) - no appreciable reaction up to 80°C. Less than 20% decrease in properties at 75% concentration.

Sodium hydroxide (caustic soda) - no appreciable reaction up to 80°C.

Sodium hypochlorate and most aqueous solutions of inorganic salts - no appreciable reaction up to 80°C.

Hydrocarbons and halogenated hydrocarbons -limited resistance. Each application should be evaluated.

314-0009-01 Rev A

Ultra High Molecular Weight Polyethylene

UHMWPE Typical Properties

Specific Gravity, 73°F	.944	
Tensile Strength @ Yield, 73°F	3250	psi
Tensile Modulus of Elasticity, 73°F	155,900	psi
Tensile Elongation (at break), 73°F	330	%
Flexural Modulus of Elasticity	107,900	psi
Compresive Strength at 2% deformation	400	psi
Compressive Strength 10% Deformation	1200	psi
Deformation Under Load	6-8	%
Compressive Modulus of Elasticity, 73°F	69,650	psi
Hardness, Durometer (Shore "D" scale)	69	
Izod Impact, Notched @ 73°F	30	ft.lbs./in. of notch
Coefficient of Friction (Dry vs Steel) Static	.17	
Coefficient of Friction (Dry vs Steel) Dynamic	.14	
Sand Wheel Wear/Abrasion Test	95	UHMW=100
Coefficient of Linear Thermal Expansion	11.0	in/in/°F x 10^{-5}
Melting Point (Crystaline Peak)	279-289	°F
Volume Resistivity	$>10^{15}$	ohm-cm
Surface Resistivity	$>10^{15}$	ohm-cm
Water Absorption, Immersion 24 Hours	Nil	%
Water Absorption, Immersion Saturation	Nil	%
Machinability Rating	5	1 = easy. 10 = difficult
Sheet Thickness Availability (Off the Shelf)	.250 - 2.0	inches

D. Barlow 06.08.01

314-0017-05 RevA

MIL-DTL-23053/5C,
CLASS 1, 2
UL STANDARD 224
CSA STANDARD 198
RoHS COMPLIANT

FIT® Preferred Heat Shrink Products
GENERAL PURPOSE, IRRADIATED POLYOLEFIN
FIT®-221

Alpha Part No. And Size	Minimum Supplied I.D. Inches	mm	Maximum Recovered I.D. Inches	mm	Nom. Recovered Wall Thickness Inches	mm	Standard Packages 4 Ft. Lengths Total Ftg.	Spools Tot. Ftg.	Spools Tot. Ftg.	Spools Tot. Ftg.	No. Cut Pieces 6 Inch	No. Cut Pieces 1/2" or 1"
FIT-221-3/64	0.046	1,17	0.023	0,58	0.016	0,41	100	1000			40	1000
FIT-221-1/16	0.063	1,60	0.031	0,78	0.017	0,43	100	1000	100	70	36	1000
FIT-221-3/32	0.093	2,36	0.046	1,17	0.020	0,50	100	500	100	65	32	1000
FIT-221-1/8	0.125	3,18	0.062	1,58	0.020	0,50	100	500	100	60	28	1000
FIT-221-3/16	0.187	4,75	0.093	2,36	0.020	0,50	100	500	100	50	24	1000
FIT-221-1/4	0.250	6,35	0.125	3,18	0.025	0,63	100	250	100	40	20	1000
FIT-221-3/8	0.375	9,53	0.187	4,75	0.025	0,63	100	200	50	35	16	1000
FIT-221-1/2	0.500	12,70	0.250	6,35	0.025	0,63	20	150	50	32	14	-
FIT-221-3/4	0.750	19,10	0.375	9,53	0.030	0,76	20	250	50	24	12	-
FIT-221-1	1.000	25,40	0.500	12,70	0.035	0,88	20	250	50	16	8	-
FIT-221-1-1/2	1.500	38,10	0.750	19,10	0.040	1,02	20	125	-	-	5	-
FIT-221-2	2.000	50,80	1.000	25,40	0.045	1,16	20	125	-	-	3	-
FIT-221-3	3.000	76,20	1.500	38,10	0.050	1,27	8	100	-	-	2	-
FIT-221-4	4.000	101,60	2.000	50,80	0.055	1,40	8	50	-	-	1	-

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SPOOL COLOR AVAILABILITY CHART

FIT-221 Tubing Size	Put-Up	Colors
3/64"	1000'	Black, Clear
1/16"	1000'	All Colors*
	100'	Black, Clear
	70'	All Colors
3/32"	500'	All Colors
	100'	Black, Clear
	65'	All Colors
1/8"	500'	All Colors
	100'	Black, Clear
	60'	All Colors
3/16"	500'	All Colors
	100'	Black, Clear
	50'	All Colors
1/4"	250'	All Colors
	100'	Black, Clear
	40'	All Colors

FIT-221 Tubing Size	Put-Up	Colors
3/8"	200'	All Colors
	50'	Black, Clear
	35'	All Colors
1/2"	150'	All Colors
	50'	Black, Clear
	32'	All Colors
3/4"	250'	All Colors
	50'	Black, Clear
	24"	All Colors
1"	250"	All Colors
	50"	Black, Clear
	16"	All Colors
1-1/2"	125'	Black, Clear
2"	125'	Black, Clear
3"	100'	Black, Clear
4"	50'	Black, Clear

*All colors include black, white, clear, red, yellow, blue, green

Achat chez:
Pro. Technique
et
Crochet

SHRINKS 50 %
SO WE NEED 1.5"
TO GET 0.75" SHRINKED

SEE PAGE 116
FOR
ECONOMICAL BULK PACKAGES!

BP 44
CUT
5.5" LONG
EACH

Web Site: www.alphawire.com
Email: info@alphawire.com
Toll Free: 1-800-52 ALPHA • Telephone: 908-925-8000 • Fax: 908-925-6923
Europe/UK Telephone: +44 (0) 1932 772422 • Europe/UK Fax: +44 (0) 1932 772433

(MORE SPECS INFO/FOR PURCHASING ONLY)

SHRINK

FIT® Preferred Heat Shrink Products

GENERAL PURPOSE, IRRADIATED POLYOLEFIN

FIT®-221

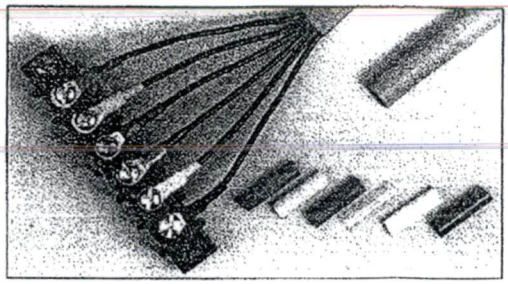
FOR BEARLAWS

MIL-DTL-23053/5C, CLASS 1, 2
UL STANDARD 224
CSA STANDARD 198

CHOOSE FIT®-221 FOR:

- General Purpose Protection and Repair
- Identification and Beautifying Substrates
- Insulation from Environment
- Reduced Longitudinal Shrinkage
- Resistance to Water, Fungus, UV Light (black only)
- Use with **XTRA•GUARD® 1**

2 TO 1 SHRINK RATIO



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FIT®-221 APPLICATIONS:

- General Purpose Insulation and Repair
- Wire and Cable Harnessing and Bundling
- Cable and Connector Protection
- Wire and Tubing Splicing and Connecting
- **XTRA•GUARD® 1** Applications
- Automated Cutting Machines (spools)

Packaged Assortments
Assorted Sizes of 6" Lengths
Each Length – Size Identified
Assorted Colors

Alpha Part No.	Tubing Size Range	Lengths Per Box
FIT-221-MS-1	3/64" – 3/16" (5 Sizes)	6 per Size (30 Lengths)
FIT-221-MS-2	1/4" – 3/4" (4 Sizes)	4 per Size (16 Lengths)

WE PURCHASE 1.5" WIDE

CHARACTERISTICS

OPERATING TEMPERATURE:
- –55°C to 135°C

SHRINKAGE RATIO:
- Approximately 2 to 1 at 121°C

COLOR DESCRIPTION:
- 4-Foot Lengths:
  3/64 to 2 Inch – Black, White, Clear, Red, Yellow, Blue, Green
  3 and 4 Inch – Black, Clear
- 6-Inch Lengths:
  3/64 to 1 Inch – Black, White, Clear, Red, Yellow, Blue, Green
  1-1/2 to 3 Inch – Black, Clear
- 1/2 or 1 Inch Cut Pieces: Black
- Spools: See Color Availability Chart Next Page

PHYSICAL PROPERTIES:
- Tensile Strength: 1500 psi, (106 kg/cm²)
- Ultimate Elongation: 200%
- Longitudinal Shrinkage: –5%
- Specific Gravity: 1.35
- Secant Modulus: 2.5 x 10^4 max.
- Flammability: Self-Extinguishing

CHEMICAL PROPERTIES:
- Corrosive Effect: Passes Copper Stability Test
- Fungus Resistance: No Growth

ELECTRICAL PROPERTIES:
- Dielectric Strength: 500V/mil (197 kV/cm)
- Volume Resistivity: 10^{14} ohm-cm

Recommended For Use With
XTRA•GUARD® 1
Extra-Premium Grade PVC Jacketed General Purpose Cables

SPECIFICATIONS

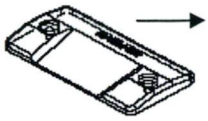
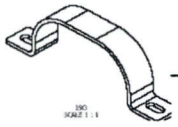
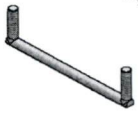
- MIL-DTL-23053/5C, Class 1, 2
- UL Standard 224 (except for Clear)
- CSA Standard 198 (except for Clear)

Recognized Component — Underwriters Laboratories Inc.
Certified — Canadian Standards Association

alpha
Toll Free: 1-800-52 ALPHA • Telephone: 908-925-8000 • Fax: 908-925-6923
Europe/UK Telephone: +44 (0) 1932 772422 • Europe/UK Fax: +44 (0) 1932 772433
Web Site: www.alphawire.com
Email: info@alphawire.com

INSP & PACK.

314-0010-00-J
Bearpaws Parts List

	Part Name	HTC P/N	Quantities per PAIR BP4466	BP350	BP130
PADS	Pad /BP44	314-0001-01	2		
	Pad /BP350	314-0018-01		2	
	Pad /BP130	314-0024-01			2
HARDWARE	Plastic bag 8x10	na	2	2	2
	Rear Filler block/BP44	314-0022-01	2		
	U-Clip / BP44	314-0006-15	4		
	U-Clip / BP350	314-0019-15		6	
	U-Clip / BP130	314-0026-15			4
	Low U-Clip/ BP44	314-0023-15	2		
	Shrink on U-Clips	314-0021-01	6	6	6
	L-Clip/BP130	314-0025-15			4
	Iceblade	263-0005-15	4	8	8
	Slotted clip support	314-0007-15	0	12	12
	Bolt - AN4-14A	261-0001-17	4	12	12
	Bolt - AN4-15A	261-0002-17	4		
	Bolt - AN4-16A	261-0003-17	4		
	Nuts - MS20365-428 *See note from S. Bernier Next page. WB				
	equiv: AN365-428A or MS21044N4	262-0001-17	20	28	28
	Washers - AN960-416	263-0001-17	32	40	40
	Filler block 1/4"	314-0012-01	4	12	
	Filler block 1/16"	314-0014-01	16		
	Filler block 1/8"	314-0015-01	4		12
DOCUMENTS	Plastic bag 9 x12	na	1	1	1
	Document - MDL/BP44	HTC-MDL-BP-R44-1000	1		
	Document - INST/BP44	314-0011-00	1		
	Document - MDL/BP350	HTC-MDL-BP-AS350-1000		1	
	Document - INST/BP350	314-0018-01-S		1	
	Document - MDL/BP130	HTC-MDL-BP-EC130-1000			1
	Document - INST/BP130	314-0031-00			1
	Can STC	na	1	1	1
	US STC	na	1	1	1
PACKAGING	Box / BP44 16.5x13x3.5"	na	1		
	Box / BP350 & BP130 24x21x3"	na		1	1
	Label /BP44	273-0001-04	1		
	Label /BP350 & BP130	273-0002-04		1	1

Nature of modifications: Modified BP44 for BP4466

D. Barbeau 2013 11 13

Nathalie Barbeau

From: Simon Bernier [simonb@ats-ast.com]
Sent: May-27-11 12:37 PM
To: Nathalie Barbeau
Subject: RE: Question de nuts

MS21044N4 est une numérotation qui remplace MS20365-428 et AN365-428A

Regards

Simon Bernier
Structure Specialist / Specialiste de Structure
E-Mail : simonb@ats-ast.com
Aviatech Services Techniques Inc. www.ats-ast.com
3005 rue Lindbergh, Trois-Rivières, Qc, G9A 5E1
Tel: (819)601-8049 (Ext :1106)
Fax:(819)377-7928

De : Nathalie Barbeau [mailto:nbarbeau@helitowcart.com]
Envoyé : 2011/05/27 10:57
À : Simon Bernier
Objet : Question de nuts

Allo Simon,
Question: Dans mes dossiers les nuts ont le no de pièce MS20-365-428.
On utilise des AN365-428A (MS21044N4).
Est-ce que cela revient au même?

Ms Nathalie Barbeau
VP Commercial Affairs

Helitowcart (Vanair inc.)
877A Alphonse-Desrochers
St-Nicolas, Levis, Qc
Canada, G7A 5K6
Tel: +1.418.561.4512
Fx : +1.418.836.4575
nbarbeau@helitowcart.com
info@helitowcart.com
www.helitowcart.com

HELI TOW CART BY VANAIR

314-0013-00-D
BearPaw Preparation & Packaging

TO DO:
CHANGE TEXT
TO ENGLISH ! ☺

1- Inspecter composantes fabriquées: *(Par Quality System Manager)*

- Utiliser formulaire *F30-01 Receiving Inspection General*
- Prendre connaissance des données d'inspection des frabricants
- Utiliser plan d'inspection prescrit (modifier le plan d'inspection au besoin)
- Assigner no de lot "LN-yymmdd-xx". (xx étant le séquentiel).
- Identifier le contenant avec le no de lot assigné, le P/N de la pièce et la quantité
- Ranger en zone de storage des pièces de BearPaws

2- Effectuer emballage des kits: *(Par Quality System Manager)*

- Insérer toutes les petites composantes dans des sacs
- Insérer les deux Pads de bearpaws ainsi que les sacs de composantes dans la boite appropriée
- Bourrer contenu de la boite de papier protecteur (si applicable)
- Apposer étiquette d'identification du type de produit sur la boîte. Cocher le produit applicable.

3- Effectuer assemblage documentaire: *(Par Quality System Manager)*

- Assembler dans sacs :
  (1) Master Document List (MDL)
  (2) Instruction d'installation du produit
  ~~(3) Certificat de manufacturier SH06-24~~ N.B 2016 06 10.
  (4) STC Transport Canada
  (5) STC FAA USA

4- Inspecter produit fini: *(Par Quality System Manager)*

- Utiliser formulaire *F40-02 Release Inspection General*
- Utiliser plan d'inspection prescrit et modifier le plan d'inspection au besoin
- Effectuer les contrôles prescrits et Enregistrer résultats.
- Enregistrer données de traçabilité des composantes utilisées (utiliser tableau en annexe si trop de données de sous lots pour le tableau situé sur le formulaire F40-02)
- Assigner no de lot "LNF-yymmdd-xx". (xx étant le séquentiel).
- Émettre certificat de relâche temporaire pour chaque kit (F40-01 Authorized Release Certificate)
- Identifier au marqueur chaque boite avec le no LNF et son no de kit (séquentiel), (no doit être bien en vue lorsque les boites sont mises prêtes à expédier)
- Apposer le formulaire F40-01 Release Certificate temporaire avec le bon séquentiel sur le rebord de chaque boite (facilement détachable pour émettre le certificat en version finale au moment venu)
- Ranger les kits assemblés dans la zone de storage des bearpaws prêts à vendre

---

5- Au moment de la vente: *(Par Quality System Manager)*

- Émettre certificat de relâche officiel (F40-01 Authorized Release Certificate).

Réaliser le certificat sur format électronique (Données électroniques localisées à : Quality System/ Official Records/ Release Certificates), le nommer avec le no de facture et nom de l'acheteur. Mettre en pied de page le nom du fichier créé. Imprimer. Signer ce certificat original.

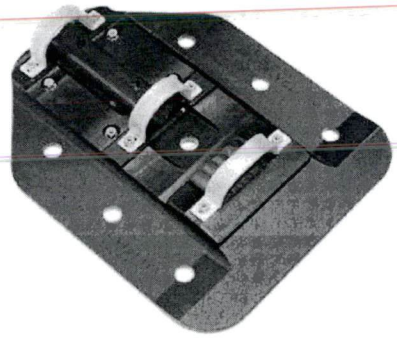
- Conserver une copie du certificat signé au DHR avec la copie temporaire, classer par ordre de no de lot.
- Insérer l'originale signée dans le sac de documents dans la boite à expédier.

Nature de la modification de l'instruction : Revue en profondeur de la méthode de travail.

D. Kaiser
2014 12 10

T: 1-418-561-4512, f: 1-418-836-4575, 877A Alphonse-Desrochers, Saint-Nicolas, Levis, Quebec, Canada G7A 5K6
www.helitowcart.com info@helitowcart.com

HELI TOW CART By Vanair



☐ BP44 BearPaw (for R44 & R66)

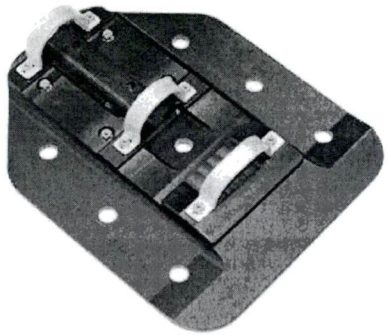
☐ _____

877A Alphonse-Desrochers, Saint-Nicholas, Levis, Quebec, Canada G7A 5K6 / Made in Canada

www.helitowcart.com +1.418.561.4512 info@helitowcart.com

htc 273-0001-04-D

HELI TOW CART By Vanair



☐ BP44 BearPaw (for R44 & R66)

☐ _____

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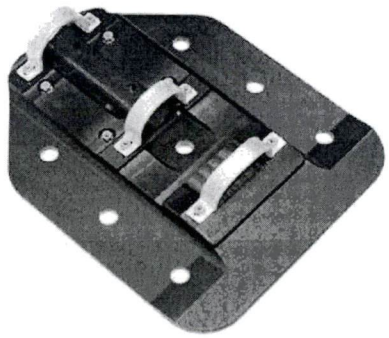
htc 273-0001-04-D

HELI TOW CART By Vanair



☐ BP44 BearPaw (for R44 & R66)

☐ _____

877A Alphonse-Desrochers, Saint-Nicholas, Levis, Quebec, Canada G7A 5K6 / Made in Canada

www.helitowcart.com +1.418.561.4512 info@helitowcart.com

htc 273-0001-04-D

D. Barbeau 2013 09 27

V:\20_ENG\2_LABELS\BOX_Labels\273-0001-04-D_BP4466_BOX_LABEL

BROCHURE

Protect your helicopter with BearPaws

HELI TOW CART

BearPaws

For **R44, R66, AS350, AS355, EC130**

BP44, BP350, BP130

Perform Safe landings on Snow, on Clear Ice, as well as on Spongy Soils & in Rivers

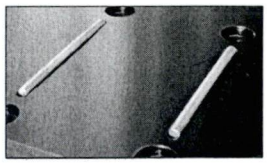
Helitowcart BearPaws offer Great Quality at an Affordable Price

Efficient Design

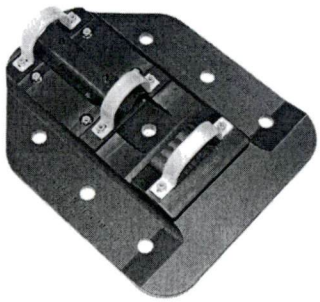
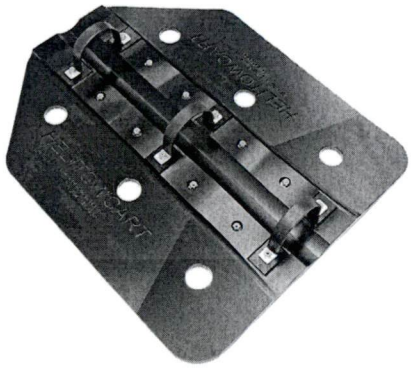
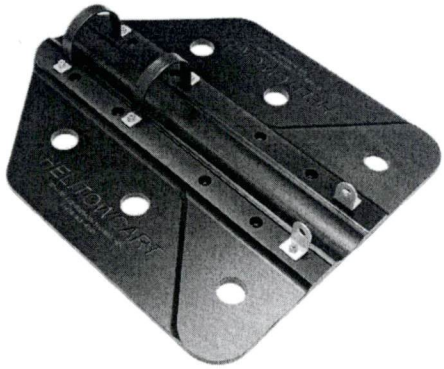
1) Pad shape streamlined to allow dust & gravel to easily flow off
2) Pad with flow holes to allow water release when taking off from rivers
3) Pad shape reinforced at rear for long term durability of landing contact point

Sturdy Construction

1) Sturdy Attachment Clips made of 14ga Stainless Steel
2) Pads made of Long Lasting UHMW-Polymer for best sturdiness-flexibility ratio
3) Pads profile optimized through finite element analysis to obtain best lightweight-strength ratio



Iceblades: Helitowcart introduced iceblades for bearpaws to provide better traction on clear ice. This reduces risks of helicopter skidding on ice. Iceblades also offer extra protection to pads especially for helicopters used for training. Iceblades are included with the BearPaw kit.

Models:	BP44	BP350	BP130
For	**R44, R66** 	**AS350, AS355** 	**EC130** 
STCs	**Canada** : Q-SH-06-24 **United States**: SR02432NY Australia & New Zealand: Use US STC	**Canada** : Q-SH-06-24 **United States**: SR02432NY Australia & New Zealand: Use US STC	**Canada** : Q-SH-06-24 **United States**: SR02432NY Australia & New Zealand: Use US STC
P/N Name: Weight	112 0001 00 BP44 Bearpaws 10 lbs / 4.54 kg	112 0002 00 BP350 Bearpaws 18.3 lbs / 8.5kg	112 0005 00 BP130 Bearpaws 20 lbs / 9.1kg

D. Bolduc 2015 02 11

ADMIN